REQUEST FOR ADDITIONAL INFORMATION
Volume 2 – Preclosure
Chapter 2.1.1.7 - Design of Structures, Systems and Components Important to Safety and Safety Controls
Set 8 (RAI #1 - #10)

RAI #1

Provide the analyses that support the statement on page 1.3.3-31 of the SAR implying that the rotational drag of the high-gear-ratio gear units provides sufficient braking action to stop the Transport and Emplacement Vehicle (TEV). The applicant references "Mechanical Handling Design Report: Waste Package Transport and Emplacement Vehicle", cited in SAR Section 1.3.3.5.1.1, but this information was not provided. This information is needed for staff to verify compliance with 10 CFR 63.112(e).

RAI #2

Explain how the design of the primary braking system will account for the downhill grade towards the emplacement drifts. It is not clear whether or not the drive system utilizes E-braking to slow down the TEV. If regenerative braking is used, provide information on the mechanism to capture the electrical power regenerated. If regenerative braking is not used, provide information on the duty cycle of the friction brakes during the 2.15% downhill and the resultant heat generation and dissipation mechanism that will ensure friction brake cooling and functionality (SAR Section 1.3.3.5.1.1).

There are potential for loss of braking force in the case of friction brakes or fire of the resistive bank in the e-braking case that must be examined. This information is needed to verify compliance with 10 CFR 63.112(e).

RAI #3

Clarify whether or not the design of the TEV will meet all sections of the ASME-NOG-1-2004, except for Section 4160-1 mentioned in the SAR Section 1.3.3.5.1. If not all Sections will be applied, provide clarification on which sections will not be used and the rationale for the exclusion. In addition, provide the following documentation referenced in SAR Section 1.3.3.5.1.1: "Waste Package Transport and Emplacement Vehicle ITS Standards Identification Study" and "Waste Package Transport and Emplacement Vehicle Gap Analysis Study." This information is needed to verify compliance with 10 CFR 63.21(c)(3), and 10 CFR 63.112(f).

RAI #4

Clarify whether or not the applicant will physically test the TEV system to verify its reliability, safety, and ability to meet performance objectives. In addition, provide the following documentation, "Waste Package Transport and Emplacement Vehicle Design Development Plan," referenced in SAR Section 1.3.3. This information is needed to verify compliance with 10 CFR 63.21(c)(3) and (16), and 10 CFR 63.112(f).

RAI #5

Justify the use of direct shafting between the electric motors and the gearbox of the TEV, rather than using options such as flexible couplings and floating shafts, as specified by the ASME NOG-1-2004 Code. The justification should include information regarding the impacts on durability, vibration, shaft alignment, and shaft fatigue fracture from the deviation of the code (SAR Section 1.3.3.5.1).

Section 5430 of the ASME-NOG-1-2004 Code requires that the connection between the electric motors and a gearbox be of a certain configuration and containing a number of elements that guarantees performance and minimizes failure. The applicant's description of the TEV drive and gearbox design implies, however, that the Code will not be followed precisely. This information is needed to verify compliance with 10 CFR 63.112(e).

RAI #6

Provide a design analysis that demonstrates the design adequacy of the TEV with respect to weight, horsepower requirements, lifting requirements, structural integrity, and motor speed determination. In addition, provide the documentation, "Transport and Emplacement Vehicle Envelope Calculation," referenced in SAR Section 1.3.3.5.1.1. This information is needed to verify compliance with 10 CFR 63. 21(c)(3).

RAI #7

Provide information on the design of the site transporter that contains information such as dimensions, lifting limits or limiting mechanisms/control, design assumptions, and analysis requirements (SAR Section 1.2.8.4.1). In addition, indicate which Sections of ASME-NOG-1-2004 Code address the following:

- fuel-tank explosion protection guidelines
- non-traditional crane lifting motion and mechanism (evident in Figure 1.2.8-49)
- guidelines on the design of brake systems for tracked-drive systems (such as motion due to backlash)

The site transporter is credited to protect against spurious movement. Since the tolerance in the movement is not provided, absolute motion prevention is implied. Since tracked systems can potentially have motion due to backlash, the information is needed to assess the applicability of the ASME-NOG-1-2004 Code to satisfy this requirement. In addition, the information is needed to determine the appropriateness of using a single standard such as ASME-NOG-1-2004 Code to design the site transporter to meet all intended safety functions. This information is needed to verify compliance with 10 CFR 63. 21(c)(3) and 63.112(f).

RAI #8

Provide rationale for not following the ASME-NOG-1-2004 Code requirement of crane speed of 1.98 mph for loads weighing between zero and 49 tons for the site transporter. This information is needed to verify compliance with 10 CFR 63. 21(c)(3) and 63.112(f).

RAI #9

The following questions pertain to applicant's Cask Tractor and Cask Transfer Trailer designs described in SAR Sections 1.2.8.4.2. This information is needed to verify compliance with 10 CFR 63.21(c)(3) and 63.112(f).

(a) Provide information on which portions of the ANSI/ITSDF B56.9-2007 Standard have been applied for designing physical speed controls of the cask tractor.

(b) Provide guidelines used for designing fuel tank explosion control features. In addition, clarify the rationale for the design criteria in Table 1.2.8-2 to preclude a cask transfer tank fuel explosion.

(c) Provide envelope drawings with dimensions and accurate component location, component motion limits (max ram travel, max pulling and pushing force), trailer height, source of power to drive the hydraulic power system, operating pressures, and force sensors. Also, provide an analysis that demonstrates that the hydraulic ram force is below expected forces that can damage the waste package and other important SSCs operating nearby.

RAI #10

The following questions pertain to applicant's Prime Mover design described in SAR Sections 1.2.8.4.3. This information is needed to assess whether or not DOE has demonstrated compliance with 10 CFR 63.21(c)(3) and 63.112(f).

(a) Provide information on the design and analyses of a representative prime mover. It should include dimensions, loaded and unloaded weights.

(b) Provide the sections of the Manual of Railway Engineering (AREMA 2007) that addresses the braking and speed limit control requirements of the rail-based movers and that ensure the reliability of the speed control.

(c) For each prime mover, provide the codes and standards that specifically address the design of the fire explosion protection of the prime movers' fuel tank.

(d) Provide clarification for use of 49 CFR 571.108. The application of this section is not clear. Also, provide clarification regarding the rationale for not using other Sections of the 49 CFR 571 code such as brakes, brake hoses, fuel system, etc.