Request for Additional Information

Docket No. 72-1040
Certificate of Compliance No. 1040
Amendment No. 4 to the HI-STORM UMAX Canister Storage System

Chapter 1 - General Information

1-1

Provide information for the staff to review the addition of the neutron shield cylinder.

The applicant has proposed to modify Page 2 to the CoC to add a neutron shield cylinder in its discussion of the transfer cask neutron shielding. The applicant did not submit any supporting documentation for this change. The staff requests that the applicant provide a description of this component including drawings and the appropriate safety analyses justifying that the inclusion of this component meets the requirements in 10 CFR 72.236.

This information is needed for the staff to determine compliance with 10 CFR 72.236.

Holtec Response:

The change to page 2 of the CoC to add the words “or neutron shield cylinder” is proposed to provide a more generic terminology for the material used to provide neutron shielding. The change to the CoC is only an editorial change. No changes to the design of the HI-TRAC or new versions of the HI-TRAC are being proposed as part of Amendment 4 to the HI-STORM UMAX CoC.

Chapter 4 – Thermal Evaluation

4-1

Clarify the following questions regarding Required Action C.2.3 of Limiting Condition for Operation (LCO) 3.1.2.

a) Summarize the technical bases to demonstrate that a completion time of 24 hours is acceptable to perform an engineering evaluation.

b) Explain how an engineering evaluation is performed to demonstrate that component temperatures are within allowable limits.

c) Describe what type of engineering evaluation is needed to demonstrate that component temperatures are within allowable limits.

Required action C.2.3 of LCO 3.1.2 of the application states that one option to return the system to operable condition would be to perform an engineering evaluation within 24 hours. It is not clear to the staff how an engineering evaluation and what type of engineering evaluation that includes analysis and results could be realistically performed in 24 hours (especially due to the complexity of the thermal model, if it is used in the evaluation). The application also states that a previous evaluation may be referenced but does not point to any reference or pervious analysis (such as previous applicable engineering evaluations or applicable Sections in the Final Safety Analysis Report). The staff needs assurance that no safety limit would be exceeded during normal, short-term, off-normal or accident conditions.

This information is needed to determine compliance with 10 CFR 72.236(b) and 10 CFR 72.236(f).

Holtec Response:

At heat loads lower than the allowable design maximum heat loads, the UMAX system can sustain a considerably longer duration of duct blockage than the 32-hour design basis evaluation. For a 100% duct blockage scenario, the 3D thermal model described in Section 4.4 of the FSAR will be adopted to determine the allowable time of blockage. This allowable duration will be higher for canisters with heat loads lower than design basis maximum heat loads than the currently allotted time of 32-hours. Either an evaluation will be performed within 24-hours or an already existing evaluation that bounds the condition on site will be used as reference to determine compliance with LCO 3.1.2. The acceptance criteria is the same as that in Section 4.6.2.3 of the FSAR which evaluates the 100% duct blockage scenario. If a similar evaluation is not available for reference, or an evaluation cannot be performed within 24-hours, required action C.2.1 or C.2.2 must be implemented. Chapter 13 of the FSAR is revised to provide further clarification.

Chapter 6 – Shielding Evaluation

6-1

Revise the Technical Specification (TS) dose rate limit in Section 5.3.4.a of Appendix A of the CoC and the location of the measurement to ensure that measurement is taken in a manner consistent with the determination that the loaded ventilated vertical module (VVM) meets site boundary annual dose limits in 10 CFR 72.104.

Results of evaluations in Tables I-3 of HI-2125194 Rev. 10, “Shielding Analysis of the HI-STORM UMAX,” (ML18285A815) and Table 5.1.3 of the Safety Analysis Report (SAR) (Revision 5, June 27, 2018) show that the standard lid gives higher site boundary dose rates than the Version B lid. This is in spite of the fact that the standard lid is overall thicker than the Version B lid and the dose rates for the Version B lid are overall higher than that of the standard lid. The only location that the dose rates are higher for the standard lid is Location 1 (per Figure 5.1.1 of the SAR) which is at the side of the lid. The site boundary annual dose is higher for the standard lid here because the Version B lid is wider and provides more shielding and it has inlet vent shielding which reduces radiation streaming. This shows that the dose rate at Location 1 is what drives the site boundary doses; therefore, measuring dose rates above the annulus is not conservative. This is also inconsistent with statements in the revised Technical Specification Bases. Proposed Section B.5.3.4 states *“These dose rate limits are set at a value above the maximum expected dose rates at the locations described in 5.3.8, from a system loaded with design basis fuel.”*

Table 5.4.3 of the SAR shows for the standard lid that the calculated dose rate at the location above the annulus is less than 1 mrem/hr. Due to inaccuracies in measurements at the lower dose rates, if the dose rate above the annulus is measured to be 3 mrem/hr, it would be 3 times higher than the calculated value and it would not be known if this is due to measurement error or if the Location 1 dose rate (that drives the site boundary dose rates) is also 3 times higher.

The staff requests that the applicant modify its TS dose rate limit at the lid and the measurement location to ensure that the loaded VVM is within the site boundary annual dose limit for both the standard and Version B lids.

This information is needed in accordance with 10 CFR 72.236(d) which requires that the storage

system's shielding design is capable of meeting the annual dose limit in 72.104.

Holtec Response:

HI-STORM UMAX Standard Lid: As mentioned above, the highest lid dose rates are observed on the side of the lid and adjacent to the inlet vent area. This is marked as Location 1 on the side of the lid and it is shown in Figure 5.1.1 of the HI-STORM UMAX FSAR. Dose rates are reported in Tables 5.1.1 and 5.1.2 of the HI-STORM UMAX FSAR. Based on the maximum dose rate reported for location 1 in those tables, the dose limit in Section 5.3.4 of the CoC is revised to be slightly less than 3 times the dose rate reported for location 1. The text describing location 1 is updated in Sections 5.3.4 and 5.3.8 of the CoC. Additional discussion is also provided in Section 5.4.2 of the HI-STORM UMAX FSAR.

HI-STORM UMAX Version B Lid: The highest lid dose rates are reported on the side of the lid and adjacent to the inlet vent area. This is marked as Location 5 on the side of the lid and it is shown in Figure I-1 of the HI-STORM UMAX calculation package. Dose rates are reported in Table I-1 of the HI-STORM UMAX calculation package. Based on the dose rates provided in Table I-1, the dose limit in Section 5.3.4 of the CoC is revised to be slightly less than 3 times the dose rate reported for location 5. Text describing the location is updated in Sections 5.3.4 and 5.3.8 of the CoC, as well as in Section 5.4.2 of the HI-STORM UMAX FSAR.

6-2

Justify using an average TS surface dose rate measurement limit in Section 5.3.3 in Appendix A of the CoC instead of using a maximum to indicate a design or loading error.

Proposed language in the Technical Specification Bases B.5.3.4 states in part: *"If measured dose rates exceed these limits, it could be an indication of a design or loading error that may require corrective actions."* Using an average of the measurements could wash out any dose rate measurements exceeding the limits that are measured locally. Currently Section 5.3.3 from Appendix A of the CoC establishes limits for meeting the average of the measured dose rates. The staff requests that the applicant justify averaging dose rates would be appropriate for identifying a design or loading error.

This information is needed in accordance with10 CFR 72.236(d) which requires that the storage system's shielding design is capable of meeting the annual dose limits in 72.104 and 72.106.

Holtec Response:

The word "average" is deleted from Section 5.3.4 in Appendix A of the CoC. As a result, all measured dose rates are required to be below the established limit. The word "gross" was added in the abovementioned sentence in Section B.5.3.4 of the Technical Specification Bases to emphasize that this measurement would uncover only significant design or loading flaws.

6-3

Provide additional information on what the minimum concrete density is.

The staff reviewed the modeling of the Version B lid within Appendix I of HI-2125194. Section

I-5 states: *"The UMAX Version B material densities and compositions are the same as those in the UMAX FSAR."* Table 5.3.2 of the HI-STORM UMAX SAR states that the concrete density used within the shielding model is 2.4 g/cm^3 (150 lb/ft^3). Note 1 to this table states that the concrete density may be less than this value.

The staff reviewed the drawings and bill of materials of the Version B lid as part of this amendment. In the bill of materials for the closure lid, drawing 10017 Rev. 5 from the HI-STORM UMAX FSAR Revision 5, June 27, 2018, the "Closure lid outer shield," and "closure lid inner shield" materials are specified by Notes 9 and 10. Note 10 states that the "minimum nominal" concrete is specified in Table 2.3.2 of the SAR which states that the nominal dry density is 150 lb/ft^3. Note 9 says material requirements are defined in Section 8.2 of the SAR. Section 8.2.2.i of the SAR discusses concrete used for shielding. This section says that: *"the shielding performance of the plain concrete is maintained by ensuring that the minimum concrete density is met during construction."* The staff requests that the applicant provide additional information on what the value of the "minimum density" is in the context of the Chapter 8 materials selection.

This information is needed in accordance with10 CFR 72.236(d) which requires that the storage system's shielding design is capable of meeting the annual dose limit in 72.104 and 72.106.

Holtec Response:

Kindly note that Holtec has not made any changes in these sections of the HI-STORM UMAX FSAR or drawing 10017 in this amendment, and is not requesting a review of these sections. The Version B lid was incorporated in accordance with the 72.48 process.

As noted above, the minimum nominal density for HI-STORM UMAX closure lid is provided in Table 2.3.2 of the SAR. This is a dry density of the concrete. During the manufacturing process, the ready mix concrete requirements for HI-STORM UMAX are controlled by Holtec Standard Procedure (HSP-1109). The procedure states that the dry unit weight (density) of the concrete mix shall be 150 pcf or greater. In conclusion, the minimum installed dry density of concrete in HI-STORM UMAX lid is 150 pcf.

6-4

Provide tolerances for the Version B lid.

Drawing 10017 Rev. 5 of the Version B lid does not include tolerances. The staff requests that the applicant provide the dimensional tolerances for the thickness of the closure lid inner and outer shield including the width. The staff is requesting this information so that it can determine that the as modeled configuration will not differ significantly from the fabricated lid.

This information is needed in accordance with10 CFR 72.236(d) which requires that the storage system's shielding design is capable of meeting the annual dose limit in 72.104 and 72.106.

Holtec Response:

Kindly note that Holtec has not revised drawing 10017 in this amendment of HI-STORM UMAX FSAR and was not requesting a review of this drawing. The Version B lid was incorporated in accordance with the 72.48 process. The dimensions and level of detail of the Version B lid on Drawing 10017, are commensurate with the standard lid drawing for the system.