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Mr. John Goshen, P.E., Project Manager – Licensing Branch
Division of Spent Fuel Storage and Transporation
Office of Nuclear Material Safety and Safeguards
Spent Fuel Storage and Transportation Division

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001

Docket No. 72-1040, Certificate of Compliance (CoC) No. 1040

Re: HI-STORM UMAX Docket Number 72-1040
Clarification of the language in the SER

Dear Mr. Goshen:

Thank you for agreeing to consider the clarification to the verbiage in the NRC's SER on HI STORM UMAX Amendment 0 related to the sub-grade shielding material in the HI-STORM UMAX ISFSI. The subject matter of this clarification memorandum pertains to the protection of the *Cavity Enclosure Container* (CEC) made of low carbon steel shell coated with a durable surface preservative in a corrosive soil environment.

Chapter 8 of the FSAR states that a CEC shell with a thin layer of concrete encasement is adequate to provide corrosion protection in a subgrade soil environment that is mildly aggressive. The steel CEC shell is coated with a preservative to increase resistance to corrosion from any moisture reaching the shell wall due to micro-cracks endemic to concrete (even if it were bare metal the concrete encasement is alkalinized making the moisture less corrosive to the steel wall). An additional measure of corrosion protection to the CEC may be necessary in those cases where the sub-grade soil used to fill the inter-CEC space contains aggressive species (please see highlighted text from the FSAR excerpted in the attachment). Alternatively, the space may be expunged of any deleterious soil and filled with concrete of a suitable density. The use of an all-concrete environment around each CEC is proposed in the FSAR submitted with the application for the HI-STORM UMAX Amendment 0 (excerpted text shown in Attachment 1) because it provides an excellent prophylactic protection to the steel in the CEC because of the pH modifying property of concrete. A concrete monolith surrounding the CEC shells, despite the cracks and voids that are inherent to it, serves to neutralize the corrosivity of the native sub-grade which lies outside the boundary of the ISFSI monolith.

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The above provision in the FSAR was evidently acceptable to the Staff as it elicited no RAI during the safety review cycle. However, the Amendment 0 SER text limits the discussion to merely concrete encased CECs (please see the relevant text excerpted and attached herein). This absence of an explicit recognition of an *all-concrete* ISFSI as an effective means to root out the adverse impact of a corrosive native soil to the long term service life of the CEC in the SER coupled with the lack of an existing precedence from established " UMAX" installations has led our client to ask us to highlight this matter, albeit a NITS item and hence of little safety import, to SFST on our docket.

We recognize that every statement and provision in the FSAR does not need to be echoed in the SER, and as such, the UMAX SER covers the range of safety significant issues appropriately to serve its intended purpose. This letter of clarification is merely intended to inform the present and future users of UMAX that the omission of the all-concrete option in the SER did not mean to signal an NRC's adverse position in this matter vis-a- vis the approved FSAR.

Subject to SFST's concurrence to the clarification summarized above, we would appreciate this clarification letter to be archived in the PDR for future reference.

Sincerely,

Kimberly Manzione
Licensing Manager
Holtec International

cc: (via email)
Ms. Michelle Sampson, USNRC
Mr. Mark Lombard, USNRC
Mr. Tony Hsia, USNRC

Attachment 1: Excerpt from HI-STORM UMAX FSAR Chapter 8

8.7 COATINGS AND CORROSION MITIGATION

In order to provide reasonable assurance that the VVM will meet its intended Design Life of 60 years and perform its intended safety function(s), chemical and galvanic reactions and other potentially degrading mechanisms must be accounted for in its design and construction. Coatings and corrosion mitigation techniques related to the MPC and HI-TRAC are discussed in Section 8.7 of the HI-STORM FW FSAR.

It should be noted that, although the CEC is a buried steel structure it is substantially sequestered from the native soil through two engineered features:

a. A thick reinforced concrete Enclosure Wall surrounds the VVM array and, along with the Support Foundation pad, provides a physical separation (water intrusion protection) to the CECs.

b. The subgrade in contact with the CECs is either a "free flow" concrete or an engineered fill selected to provide a non-aggressive environment around the CECs.

The above engineered features provide an environmentally benign condition for the CECs. The above said, although the CEC is not a part of the MPC confinement boundary, it should not corrode to the extent where localized in-leakage of water occurs or where gross general corrosion prevents the component from performing its primary safety function. In the following, considerations in the VVM's design and construction consistent with the applicable guidance provided in ISG-15 [8.1.1] are summarized.

All VVM components are protected from galvanic corrosion by appropriate designs. Except for the CEC exterior surfaces (exterior CEC surface coating requirements discussed separately), all steel surfaces of the VVM are lined and coated with the same or equivalent surface preservative that is used in the aboveground HI-STORM FW and HI-STORM 100 overpacks. The pre-approved surface preservative is a proven zinc-rich inorganic/metallic (may also be an organic zinc rich coating) material that protects galvanically and has self-healing characteristics for added protection. All exposed surfaces interior to the VVM are accessible for the reapplication of surface preservative, if necessary.

Additional preemptive measures to prevent corrosion are essential, if the substrate is of aggressive chemistry. A description of corrosion mitigation measures proposed to protect the HI-STORM UMAX systems and which are also approved for use in HI-STORM 100U VVM in Docket Number 72-1014, are presented in the following.

The native soil excavated at the ISFSI site shall preferably not be used as subgrade unless it has the requisite density and low corrosivity. To evaluate soil corrosivity, a "10 point" soil-test evaluation procedure, in accordance with the guidelines of Appendix A of ANSI/AWWA C105/A21 [8.7.1] will be utilized. The classical soil evaluation criteria in the aforementioned standard focuses on parameters such as: (1) resistivity, (2) pH, (3) redox (oxidation-reduction) potential, (4) sulfides, (5) moisture content, (6) potential for stray current, and (7) experience with existing installations in the area. Using the procedure outlined in ref.[8.7.1] , the ISFSI soil environment corrosivity is categorized as either "mild" for a soil test evaluation resulting in 9 points or less or "aggressive" for a soil test evaluation resulting in 10 points or greater. The following table details the corrosion mitigation measures that shall be necessary if the native soil is used as the subgrade:

Implementation of Corrosion Mitigation Measures			
Soil Environment Corrosivity	**Corrosion Mitigation Measures**		
	Coating (see note (i))	Concrete Encasement (see note (ii))	Cathodic Protection (see note (iii))
Mild	Required	Choice of either concrete encasement or cathodic protection; or both	
Aggressive	Required	Optional	Required

Notes:
i. An acceptable exterior surface preservative (coating) applied on the CEC.
ii. Concrete encasement of the CEC external surfaces to establish a high pH buffer around the metal mass.
iii. A suitably engineered impressed current cathodic protection system (ICCPS).

The corrosion mitigation measures tabulated above are further detailed in the following subsections:

i. Exterior Coating

The CEC exterior shall be coated with a radiation resistant surface preservative designed for below-grade and/or immersion service. Inorganic and/or metallic coatings are sufficiently radiation-resistant for this application; therefore, radiation testing is not required. Organic coatings such as epoxy, however, must have proven radiation resistance or must be tested without failure to at least 10^7 Rad. Radiation resistance to lower radiation levels is acceptable on a site-specific basis. Radiation testing shall be performed in accordance with ASTM D 4082 [8.7.6] or equivalent. The coating should be conservatively treated as a Service Level II coating as described in Reg. Guide 1.54 [8.7.3]. As such, the coating shall be subjected to appropriate quality assurance in accordance with the applicable guidance provided by ASTM D 3843-00 [8.7.4]. The coating should preferably be shop-applied in accordance with manufacturer's instructions and, if appropriate, applicable guidance from ANSI C 210-03 [8.7.5]. The following table provides the acceptance criteria for the selection of coatings for the exterior surfaces of the CEC and ranks them in order of importance.