

Request for Additional Information
NAC-UMS System
Docket No. 72-1015
Certificate of Compliance Renewal

By letter dated October 13, 2020, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20293A102), NAC International (NAC) submitted an application for renewal of Certificate of Compliance (CoC) No. 1015 for the NAC Universal Multipurpose Systems (NAC-UMS). In my letter dated, March 25, 2021, I acknowledged acceptance of your application for a detailed technical review and provided a proposed schedule for the U.S. Nuclear Regulatory Commission (NRC) review (ADAMS Accession No. ML21060B298). This request for additional information (RAI) identifies information needed by the U.S. Nuclear Regulatory Commission (NRC) staff in connection with its technical review of the renewal application. The requested information is listed by chapter number and title in the renewal application. The staff used NUREG-1927, Revision 1, "Standard Review Plan for Renewal of Specific Licenses and Certificates of Compliance for Dry Storage of Spent Nuclear Fuel" and NUREG-2214, "Managing Aging Processes in Storage (MAPS) Report" in its review of the renewal application. Where noted, the RAI is also applicable to CoC No. 1025 for the NAC-Multi-Purpose Canister (NAC-MPC).

Each individual RAI describes information needed by the staff for it to complete its review of the renewal application and to determine whether the applicant has demonstrated compliance with the regulatory requirements.

Section 2 – Scoping Evaluation

- 2-1 Provide additional information to justify the exclusion of the transfer cask lead wool from the scope of the aging management review.

Revision 11 of the NAC-UMS Final Safety Analysis Report (FSAR), Table 2.3-1, stated that the lead wool in the transfer cask has operations and shielding functions. That entry has since been revised to remove the shielding function. Clarify the basis for that change to support the conclusion that the lead wool is not within the scope of renewal.

This information is needed to demonstrate compliance with 10 CFR 72.240(c).

Section 3 – Aging Management Review

- 3-1 Provide additional justification for the conclusion that galvanic corrosion of the Vertical Concrete Cask (VCC) steel lid is not an aging effect requiring management.

Table 3.2-1 of the renewal application concludes that the VCC steel lid exposed to an outdoor air environment is not subject to galvanic corrosion. Section 3.2.1.1.3 of the renewal application provides an evaluation of galvanic corrosion of steel components; however, the evaluation did not include the steel lid in contact with the stainless steel lid bolts.

Enclosure

The conclusion that galvanic corrosion is not a credible aging mechanism does not appear to be supported by the pre-application inspection described in Appendix E. The inspection of the Maine Yankee NAC-UMS system found that the carbon steel lid bolt holes experienced corrosion due to interaction with the stainless steel lid bolts. That finding is also consistent with the NUREG-2214 conclusion that the galvanic corrosion of carbon steel is credible when in dissimilar metal contact in outdoor environments.

If galvanic corrosion is reconsidered to be a credible aging mechanism, revise the aging management review, as appropriate.

This information is needed to demonstrate compliance with 10 CFR 72.240(c).

- 3-2 Provide a technical justification for the conclusion that thermal aging is not a credible aging mechanism for the precipitation-hardened stainless steel fuel basket support discs within the transportable storage canister.

Table 3.2-1 of the renewal application states that thermal aging of the 17-4 PH precipitation-hardened stainless steel fuel basket support discs is not a credible aging mechanism. In support of that conclusion, Section 3.2.1.2.8 of the renewal application states that the maximum long-term service temperature of the support discs is 316°C (601°F), which is below the 343°C (650°F) maximum allowable service temperature in ASME BPVC Section II, Part D.

As described in Section 3.2.2.8 of NUREG-2214, embrittlement of precipitation-hardened stainless steel has been observed below the ASME maximum-allowable temperature. NUREG-2214 cites a study by Olender et. al (2015), which provides operating experience and guidance for assessing the potential for embrittlement for operating temperatures between 243 and 316°C [470 to 600°F].

This information is needed to demonstrate compliance with 10 CFR 72.240(c).

Reference

Olender, A., J. Gorman, C. Marks, and G. Ilevbare. "Recent Operating Experience Issues with 17-4 PH in LWRs." Fontevraud 8: Conference on Contribution of Materials Investigations and Operating Experience to LWRs' Safety, Performance and Reliability. France. 2015.

Appendix A – Aging Management Programs

- A-1 Provide a justification for the option in the Localized Corrosion and Stress Corrosion Cracking of Welded Stainless-Steel Transportable Storage Canisters (TSC) aging management program (AMP) that allows a general licensee to choose not to conduct the canister inspections. Otherwise, revise the renewal application to remove that option.

The AMP for the canister inspections provides an independent spent fuel storage installation (ISFSI) site the option of not conducting inspections if the site provides a justification. The AMP does not provide any criteria for that justification. In addition, the

staff notes that, if the site does not perform the canister inspections, the site would also not perform the activities under the Internal VCC Metallic Components Monitoring AMP. The inspections under the VCC AMP occur only when canister inspections are conducted.

Provide additional information that justifies this approach, addressing the following:

- The TSC AMP provides the option for not conducting inspections in a manner that does not appear to require a general licensee to evaluate such a deviation under the provisions of 10 CFR 72.212 and 72.48 (see RIS 2012-05). The staff notes that the guidance in NUREG-1927, Appendix E, and NEI 14-03, Section 2.2.3, cite the use of the 72.212 and 72.48 processes as the appropriate means to make changes to aging management programs. As articulated in NEI 14-03:

10 CFR 72.48 provides the appropriate set of public health and safety-based criteria for determining whether NRC review and approval of revised TLAAAs [time-limited aging analyses] and AMPs is required prior to implementation.

Absent this change control process, it is unclear to the staff how deviations from the AMP canister inspection activities will be appropriately evaluated by the general licensee and be inspectable by the NRC.

- The guidance in NUREG-1927 states that, if an AMP may not be applicable to certain general licensees, the AMP should specify this. The canister AMP does not provide any details for either the general licensee or the NRC staff to evaluate if the option for not performing inspections is appropriate. In addition, the staff has previously noted its concern for the use of surrogates (inspections conducted at another site) as a basis for not conducting inspections until such time when there is sufficient operating experience to justify that approach (see Regulatory Guide 3.76, regulatory position C.1).

The staff requires this additional information to understand what constitutes an adequate technical basis to justify a general licensee's decision to not follow the canister AMP (and by extension, the VCC AMP) and how this process provides an adequate opportunity for NRC oversight.

This information is needed to demonstrate compliance with 10 CFR 72.240(c).

A-2 [Applies to NAC-UMS and the NAC-MPC]

Justify how the proposed inspection methodology for the supplemental examination in the Localized Corrosion and Stress Corrosion Cracking of Welded Stainless-Steel TSC AMP will be capable of identifying and sizing a crack.

The Localized Corrosion and Stress Corrosion Cracking of Welded Stainless-Steel TSC AMP includes a supplemental examination to further examine major indications of corrosion. In the Acceptance Criteria program element, item 6.4, the proposed examination methodology is "VT-3, VT-1, or other interrogative nondestructive techniques."

It is unclear to staff how the proposed inspection methodology will be capable of identifying and sizing cracking, as the listed techniques are not generally considered to be appropriate for that task. Section 3.4.3.1 of the renewal application states that the subject AMP intends to follow the guidelines in Electric Power Research Institute (EPRI) Report TR-3002008193 (EPRI, 2017); however, the EPRI guidelines include the use of surface or volumetric techniques when examining major indications of corrosion at or near a weld. Similarly, ASME Code Case N-860 (ASME, 2020) requires the use of surface or volumetric techniques.

This information is needed to evaluate compliance with 10 CFR 72.240(c).

References

ASME. American Society of Mechanical Engineers Boiler and Pressure Vessel Code Case N-860, "Inspection Requirements and Evaluation Standards for Spent Nuclear Fuel Storage and Transportation Containment Systems," July 2020.

EPRI. Aging Management Guidance to Address Potential Chloride-Induced Stress Corrosion Cracking of Welded Stainless Steel Canisters, Technical Report No. 3002008193, Electric Power Research Institute, 2017.

A-3 [Applies to the NAC-UMS and the NAC-MPC]

In the AMR Tables and the proposed revision to FSAR Chapter 14, clarify if the Internal and External [external not applicable to the MPC] VCC Metallic Components Monitoring AMPs are activities credited to manage the effects of aging.

FSAR Tables 14.3-6 [14.3-5 for the MPC] and 14.3-7 in Appendix C of the renewal application include proposed AMPs for the inspection of metallic VCC components. However, there are no AMR line items that credit the use of these AMPs to manage the effects of aging. The renewal application states that aging of the metallic VCC components is addressed by the TLAA that concluded that corrosion will not prevent the VCCs from fulfilling their important-to-safety functions.

It is unclear to the staff if the Internal VCC Metallic Components Monitoring AMP and External VCC Metallic Components Monitoring AMP [external not applicable to the MPC] are relied on to manage the effects of aging. Provide clarifications to the AMR tables and proposed FSAR revisions to establish the purpose of the subject AMPs and whether they are to be performed by general licensees to fulfill aging management requirements of the renewed CoC.

This information is needed to evaluate compliance with 10 CFR 72.240(c).

A-4 Clarify the basis for the conclusion that visual inspections will be capable of verifying the shielding performance of concrete in the Reinforced VCC Structures – Concrete Monitoring AMP.

Section 3.4.3.4 of the renewal application states that shielding tests of the VCC concrete are not needed, citing an NRC analysis of the use of ACI 349.3R visual inspection

parameters to evaluate concrete shielding efficacy (NRC, 2019). However, the cited NRC analysis did not include an evaluation of the NAC-UMS system. In addition, the analysis found that the comparable NAC-MPC and similar systems with BWR contents may not be able to rely on the ACI 349.3R inspection parameters to assess shielding performance. Given this conclusion of the cited analysis, provide additional information to support the conclusion that visual inspections, in lieu of radiation surveys, can be used to ensure the VCCs maintain their shielding function in the period of extended operation.

This information is required to demonstrate compliance with 10 CFR 72.240(c).

Reference

NRC. "Study of ACI 349.3R Concrete Evaluation Criteria Impacts on Dose Rates for Several Spent Fuel Dry Storage System Designs." Washington, DC. ADAMS Accession No. ML19072A031. 2019

- A-5 For those facilities that do not normally maintain a Transfer Cask and Transfer Adapter on site, clarify the controls that will be in place to ensure that aging management activities will be performed prior to placing those components into service at the site.

Table A-5 and proposed FSAR Table 14.3-9 in the appendices of the renewal application state that the Transfer Cask/Transfer Adaptor AMP is not applicable to facilities not maintaining the components on site. It is not clear to the staff what controls will be in place to ensure that aging of the transfer components will be managed. The AMP statements presume that aging management activities will be performed by another facility housing these components. However, given the fact that the AMP does not require periodic inspections for transfer casks that are not in use for extended periods (but rather requires a return-to-service inspection in that case), a general licensee cannot assume that aging management inspections have been performed by the facility normally housing the transfer cask.

This information is needed to evaluate compliance with 10 CFR 72.240(c).

- A-6 [Applies to the NAC-UMS and the NAC-MPC]
State how visual inspection parameters will be controlled to ensure that the AMPs for the VCC and transfer cask components will be capable of identifying degradation. The AMPs detailed in Tables A-2, A-3, and A-6 [A-5 rather than A-6 for the MPC] of the renewal application for the VCC and transfer cask rely on general visual inspections to identify degradation. The AMPs do not cite consensus code criteria nor alternative approaches that describe how procedures are controlled to ensure that inspectors will use sufficient resolution and lighting to identify the parameters monitored. Revise the AMPs for the VCC and transfer cask, as appropriate, to clarify the expectations of the general licensees for controlling visual inspection parameters.

This information is required to demonstrate compliance with 10 CFR 72.240(c).

- A-7 [Applies to the NAC-UMS and the NAC-MPC]

Clarify the proposed changes to FSAR Sections 9.2.1 and 9.2.2 [9.A.3.1 and 9.A.3.2 for the MPC] with respect to when the annual inspections of the VCCs and transfer casks will be replaced by the associated AMP activities for the individual storage systems.

The proposed FSAR Sections 9.2.1 and 9.2.2 [9.A.3.1 and 9.A.3.2 for the MPC] in Appendix C of the renewal application both state:

After the approval of the 40-year CoC renewal term General Licenses will adopt the aging management programs (AMPs) as described in Chapter 14 *for their sites period of extended operation (PEO)* [emphasis added].

The staff notes that the emphasized text above does not accurately describe the renewed licensing basis, as general licensee sites do not have a PEO. Rather, the PEO applies to the CoC, and by extension, to each individual dry storage system (as described in NUREG-1927, Section 3.6.2, “Commencement of AMP(s) for CoC Renewals,” and Appendix F, “Storage Terms” (NRC, 2016). Unless otherwise specified in the CoC or FSAR, AMPs are considered to apply to each individual dry storage system when that storage system enters its renewed storage period. As a result, provide clarity to the FSAR with respect when AMP activities begin for the individual storage systems.

This information is required to demonstrate compliance with 10 CFR 72.240(c).

Reference

NRC. NUREG–1927, “Standard Review Plan for Renewal of Specific Licenses and Certificates of Compliance for Dry Storage of Spent Nuclear Fuel.” Revision 1. ADAMS Accession No. ML16179A148. Washington, DC: U.S. Nuclear Regulatory Commission. 2016.