

Enclosure 9 to E-56694

**Amendment 17 Impacts on CoC 1004 Renewal
(Public)**

Amendment 17 to NUHOMS® CoC No. 1004

Impacts on CoC 1004 Renewal

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1 Purpose

As required by certificate of compliance (CoC) Condition III.2, this enclosure evaluates impacts to aging management activities (i.e., time-limited aging analyses (TLAAs) and aging management programs (AMPs)) to ensure that they remain adequate for any changes to structures, systems, and components (SSCs) within the scope of renewal due to Amendment 17.

1.1 Brief Description of Amendment 17

Amendment 17 changes result in the addition of three new heat load zoning configurations (HLZCs) for the 61BTH Type 2 Dry Shielded Canister (DSC). They are HLZC 11, 12, and 13. Of the three new HLZCs, HLZC 11 represents the bounding HLZC.

1.2 Time-Limited Aging Analyses

The TLAAs for Amendment 17 SSCs are based on the AMR results presented in CoC No. 1004 renewal application [1], Chapter 3, Sections 3.5, 3.6, 3.7 and 3.8 for DSCs, horizontal storage modules (HSMs), transfer casks (TCs), and spent fuel assemblies (SFAs), respectively.

The identified TLAAs and other supplemental/support evaluations are presented in Appendix 3 of the CoC 1004 renewal application. Accordingly, the following TLAAs were reviewed for impact due to Amendment 17 changes:

- Fatigue Evaluation of the Dry Shielded Canisters (Reference 1, Appendix 3A)

The scope of CoC 1004 Amendment 17 adds three new HLZCs: HLZC 11, 12, and 13. Of the three new HLZCs, HLZC 11 provides the bounding DSC shell temperatures. The DSC shell temperature for HLZC 11 is bounded by the existing TLAA evaluation. Since the temperatures are bounded by the existing evaluation, there is no change to the internal DSC pressure. Therefore, there is no effect on the fatigue evaluation presented in this TLAA.

- Fatigue Evaluation of the Transfer Casks (Reference 1, Appendix 3B)

Similar to the DSC fatigue evaluation discussed above, the TC temperatures as used in the current design basis analysis are also bounding of HLZC 11. Therefore, there is no effect on this TLAA due to Amendment 17.

- Evaluation of Additional Cladding Oxidation and Additional Hydride Formation Assuming Breach of Dry Shielded Canister Confinement Boundary (Reference 1, Appendix 3H)

The cladding oxidation evaluation is based on the 32PTH1 DSC with the initial heat load of 40.8 kW, which represents the maximum heat load. This is bounding for the 61BTH Type 2 design basis DSC, which has a maximum initial heat load of 31.2kW. The maximum fuel cladding temperature for HLZC 11 is bounded by the existing CoC 1004 61BTH Type 2 design. This TLAA is based on a fuel cladding temperature for the 32PTH1 DSC that bounds both 61BTH Type 1 and Type 2 DSCs. Therefore, Amendment 17 has no impact on this TLAA.

- Dry Shielded Canister Poison Plates Boron Depletion Evaluation (Reference 1, Appendix 3D)

Amendment 17 uses more reasonable burnup/enrichment combinations that result in less penalizing neutron sources. Since the neutron source in the TLAA is still bounding, there is no impact due to Amendment 17.

- Evaluation of Neutron Fluence and Gamma Radiation on Storage System Structural Materials (Reference 1, Appendix 3E)

Amendment 17 uses more reasonable burnup/enrichment combinations that result in less penalizing neutron sources. Since the neutron source in the TLAA is still bounding, there is no impact due to Amendment 17.

For Amendment 17, the cooling time has been reduced a to 1-year minimum and the decay heat has been increased to 1.7 kW, which increases the boiling water reactor (BWR) gamma source compared to previously evaluated values.

However, the 37PTH DSC bounds all other DSCs. The total gamma exposure for the 37PTH bounds the value estimated for the 61BTH. Therefore, there is no impact from Amendment 17.

- Confinement Evaluation of 24P and 52B Non-Leaktight DSCs (Reference 1, Appendix 3F)

These DSCs are not related to the proposed 61BTH changes. Therefore, there is no impact from Amendment 17.

- Horizontal Storage Module Concrete and Dry Shielded Canister Steel Support Structure Thermal Fatigue, Corrosion, and Temperature Effects Evaluation (Reference 1, Appendix 3C)

There are no changes to the HSM as part of Amendment 17.

- Structural Assessment of High Burnup Cladding Performance during Period of Extended Operation (Reference 1, Appendix 3J)

Amendment 17 does not introduce any new fuel designs. The three new HLZCs also result in lower temperatures. Therefore, there is no impact on this evaluation.

- Defense-in-Depth Structural Evaluation of Dry Shielded Canister Confinement and Retrieval Assuming High Burnup Fuel Cladding Failure during Period of Extended Operation (Reference 1, Appendix 3M)

Since the maximum temperatures for Amendment 17 are lower than those considered in the TLAA, there is no impact.

- Bounding Evaluation of Dry Shielded Canister with Reduced Shell Thickness Due to Chloride-Induced Stress Corrosion Cracking under Normal and Off Normal Conditions of Storage during Renewal Period (Reference 1, Appendix 3N)

This evaluation considers 32PTH1 DSC with 40.8 kW heat load as the bounding DSC to determine the minimum required shell thickness. There are no changes to the 61BTH Type 2 DSC design that would invalidate the selection of the bounding DSC considered in this evaluation. Therefore, there is no impact.

- Thermal Performance of Horizontal Storage Modules for the Period of Extended Operation (Reference 1, Appendix 3G)

This evaluation determines the shell temperatures of the DSCs throughout the period of extended operation. There are no changes to the shell temperatures as part of Amendment 17 since the maximum heat load of 31.2 kW remains unchanged for the 61BTH Type 2 DSC.

- Evaluation of Cladding Gross Rupture during Period of Extended Operation (Reference 1, Appendix 3I)

The incubation time evaluated in the TLAA is a function of the maximum fuel cladding temperature. Since the maximum fuel cladding temperature evaluated in Amendment 17 remains bounded by the design basis temperatures from HLZC 7, there is no impact on the incubation time. Therefore, the TLAA conclusion that the development of a gross rupture due to a hypothetical breach of the DSC after 20 years of dry storage is an unlikely event remains unchanged.

- Defense-in-Depth Thermal Evaluation of Dry Shielded Canister Internal Pressures Assuming High Burnup Fuel Cladding Failure during Period of Extended Operation (Reference 1, Appendix 3L).

This TLAA considers the bounding internal pressure after 20-year storage with 10% rupture of HBF. The internal pressure is a function of the maximum fuel cladding temperature and since the maximum fuel cladding temperature evaluated in Amendment 17 remains bounded by the design basis temperatures from HLZC 7, there is no impact.

Based on the above, TN Americas LLC has determined that the TLAA results provided in Appendix 3 of the renewal application remain bounding and applicable for Amendment 17.

1.3 Aging Management Programs

The AMP is presented in CoC No. 1004 renewal application [1], Appendix 6A for DSCs, HSMs, TCs, and the HBU Fuel. The AMP is based on the results of the AMR or the DSCs, HSMs, and TCs presented in Chapter 3, Sections 3.5, 3.6, and 3.7, respectively, of the renewal application.

The following AMPs were evaluated for impact due to Amendment 17.

- DSC External Surfaces Aging Management Program
- DSC Aging Management Program for the Effects of CISCC
- HSM Aging Management Program for External and Internal Surfaces
- HSM Inlets and Outlets Ventilation Aging Management Program
- Transfer Cask Aging Management Program
- High Burnup Fuel Program

The scope of Amendment 17 does not result in any change in the design configuration of the 24P DSC, 24P Long Cavity DSC, 52B DSC, 24PT2 DSC, 24PHB DSC, 61BT DSC, 24PTH DSC, 32PT DSC, 32PTH1 DSC, 69BTH DSC, 37PTH DSC, HSM-H, HSM (Model 80, Model 102, Model 152 and Model 202), Standardized TC, OS197 TC, and OS200 TCs. The design changes for the 61BTH DSC as part of Amendment 17 are only associated with the addition of three new HLZCs. These changes have no impact on any of the ten elements prescribed for the AMPs.

There are no changes to the geometry or materials, service environments of the components, or any addition of new components that would require any changes to the safety classifications of the in-scope SSCs for the 61BTH DSCs as a result of the scope of Amendment 17.

TN Americas LLC has determined that the AMPs provided in Appendix 6A of the renewal application are unaffected and remain bounding and applicable for the Amendment 17 scope of adding three new HLZCs for the 61BTH Type 2 DSC.

1.4 Conclusions

The scope of Amendment 17 does not impact the renewed CoC 1004 aging management activities (i.e., TLAAs and AMPs). These aging management activities remain adequate for those SSCs within the scope of renewal.

2 References

1. Letter from Jayant Bondre (AREVA) to NRC Document Control Desk, “Response to Re-Issue of Second Request for Additional Information - AREVA Inc. Renewal Application for the Standardized NUHOMS[®] System - CoC 1004 (Docket No. 72-1004, CAC No. L24964),” dated September 29, 2016 (ML16279A367).