

Enclosure 1

**Westinghouse's Responses to the NRC's Request for Supplemental
Information (RSIs) and Observations (OBSs)
(8 Pages)**

**Request for Supplemental Information
Docket No. 72-1026 Westinghouse Electric Company
FuelSolutions™ Spent Fuel Management
System Certificate of Compliance No.1026
Renewal Application**

By letter dated November 6, 2020 [Agencywide Document Access and Management System (ADAMS) Accession No. ML20315A012], Westinghouse Electric Company (Westinghouse) submitted to the U.S. Nuclear Regulatory Commission (NRC) a request to renew the Certificate of Compliance (CoC) No. 1026 for the FuelSolutions™ Spent Fuel Management System.

The staff has performed an acceptance review of the application and determined that the application does not provide sufficient technical information to begin a detailed review and that supplemental information is needed. The information needed to continue the staff's review is described in the request for supplemental information (RSI) below.

Scoping Evaluation

RSI 2-1 Revise the renewal application to clarify the subcomponents of the FuelSolutions™ Spent Fuel Management System (including the SENTRY™ addenda) that were determined to be within and outside of the scope of renewal.

The combined scoping and aging management review tables in Chapter 2 of the renewal application include all subcomponents listed in the drawings for the in-scope structure, system, and components, including those categorized as not important to safety (NITS). It is unclear to the staff which of the NITS subcomponents were determined to be within and outside of the scope of renewal.

The staff notes that some of the tables specifically identify the NITS subcomponents that were determined to be outside the scope of the renewal because their failure would not prevent the fulfillment of an important-to-safety (ITS) function, such as Table 2-6 for the transfer cask.

However, other tables do not address the scoping of NITS subcomponents, such as Tables 2- 4a and 2-4b for the canisters. NUREG-1927, Revision 1, Section 2.4.2, provides guidance that the staff's review of the renewal application includes a verification that all NITS components whose failure could affect an ITS function are appropriately scoped into the aging management review. Revise the renewal application to clearly identify the scoping determination for each of the NITS subcomponents. In addition, if any ITS subcomponents were determined to be outside the scope of renewal (i.e., they no longer have that ITS function during the period of extended operation), clarify that scoping determination in the application as well.

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

Response to RSI 2-1

The CoC 1026 License Renewal Applications for the FuelSolutions™ and SENTRY™ systems included scoping evaluations and aging management reviews which were conducted following the guidance and patterns established in NUREG-1927 and NUREG-2214. As stated in the

FuelSolutions and SENTRY scoping evaluations (Section 2.2.3), the Important to Safety (ITS) components identified in the FuelSolutions and SENTRY Safety Analysis Reports (SARs) were listed and described as being in scope in the scoping evaluations. As shown in the FuelSolutions and SENTRY scoping evaluation Tables 2-4a, 2-4b, 2-5, 2-6, 2-7 and 2-8, the ITS subcomponents and parts were included in the scope for the license renewal, and aging management reviews were conducted.

For the FuelSolutions and SENTRY Not Important to Safety (NITS) subcomponents and parts, the pattern established in NUREG-2214 Tables 4-21, 4-22., and 4-23 for the FuelSolutions Canister, the FuelSolutions Storage Cask and the FuelSolutions Transfer Cask, respectively, were followed in determining the in-scope NITS subcomponents and parts, and aging management reviews were then conducted. The results of these NITS in-scope subcomponents and parts aging management reviews are shown in Tables 2-4a, 2-4b, 2-5, 2-6, 2-7 and 2-8 of the FuelSolutions and SENTRY renewal applications. If a NITS subcomponent or part has an aging management review in these tables, the NITS subcomponent or part is considered to be in scope for the license renewal.

NUREG-2214 Table 4-21 included aging management reviews for the FuelSolutions Canister NITS subcomponents and parts. NUREG-2214 Tables 4-22 and 4-23 included aging management reviews for most of the FuelSolutions Storage Cask and Transfer Cask NITS subcomponents and parts. The FuelSolutions Storage Cask and Transfer Cask NITS subcomponents and parts not identified in NUREG-2214 Tables 4-22 and 4-23 were items such as O-rings, gaskets, vent screens, vent screen retainer plates, name plates and other associated NITS hardware which are easily accessible for inspection and replacement as necessary as part of a routine maintenance program. As noted in RSI 2-1, these out of scope NITS cask items were listed separately at the bottom of FuelSolutions and SENTRY Renewal Application Chapter 2 Tables 2-5 and 2-6 for the Storage Casks and Transfer Casks, respectively.

In reviewing the NITS subcomponents and parts, Westinghouse used the NUREG-2214 approach of classifying most NITS items as being in-scope in determining if aging deterioration or failure of a NITS item internal to a cask or canister could potentially adversely affect the performance of an ITS subcomponent or part safety function. It is conservative to conclude that most NITS items are in scope for the license renewal and perform aging management reviews on most NITS subcomponents and parts.

This NITS in-scope evaluation process description will be incorporated in the FuelSolutions and SENTRY Chapter 2 Scoping Evaluations.

RSI 2-2 Provide a drawing for the SENTRY™ W110 Transfer Cask Neutron Shielding Shell that identifies the materials, applicable codes, safety classification, and configuration of the transfer cask subcomponents.

The combined scoping and aging management review table in Chapter 2 of the SENTRY™ renewal application references drawing WDD-DW-00126-GEN for the W110 transfer cask neutron shielding shell. The staff notes that the referenced drawing does not appear to be included in the SENTRY™ Dry Storage System Safety Analysis Report (Revision 0).

To support the staff's review of the scoping evaluation, provide the subject drawing. This information is needed to confirm compliance with 10 CFR 72.236(d) and 72.240(d).

Response to RSI 2-2

Inadvertently, drawing WDD-DW-00126 "SENTRY™ W110 Transfer Cask – Neutron Shielding Shell" was not included the submitted version of the SENTRY™ Dry Storage System Safety Analysis Report (ML20121A214). A copy of the drawing is attached and it will also be included in a future amendment submittal.

Aging Management Review

RSI 3-1 In the FuelSolutions™ W100 Transfer Cask Aging Management Program (AMP), describe the activities that will be performed to manage the identified aging effects for the solid neutron shielding material.

The aging management review (AMR) for the FuelSolutions™ system concluded that loss of shielding due to boron depletion was a credible aging effect for the neutron shield material in the top and bottom covers of the W100 transfer cask. The AMR table states that the W100 Transfer Cask AMP will be used to manage the aging effect. However, the W100 Transfer Cask AMP does not describe any activities for how that aging effect will be managed. Although the AMP includes dose rate acceptance criteria for the RX-277 solid neutron shield material, the AMP does not include any description of dose monitoring parameters, methodology, or frequency of activities that will be performed to verify that the acceptance criteria are met. In addition, the AMP does not address the NS-3 shielding material that is also managed by the Transfer Cask AMP.

Revise the Parameters Monitored/Inspected and Detection of Aging Effects program elements of the W100 Transfer Cask AMP to describe the activities that will be performed to ensure that the shielding performance of the RX-277 and NS-3 solid neutron shielding materials will be maintained.

This information is needed to determine compliance with 10 CFR 72.236(d), 72.240(c)(3) and 72.240(d).

Response to RSI 3-1

The FuelSolutions W100 Transfer Cask AMP has been expanded to include a verification radiation surveillance inspection of the RX-227 solid neutron shielding material in the top, bottom, and ram access covers of a loaded W100 transfer cask once per loaded fuel canister transfer campaign. This neutron shielding verification inspection requirement addresses dose monitoring parameters, methodology, and frequency of activities that will be performed to verify that the FuelSolutions FSAR neutron shielding acceptance criteria are met during the period of extended W100 transfer cask operation. This neutron shielding material radiation surveillance requirement has been written to also be applicable to NS-3 solid neutron shielding material at such time as NS-3 is used in W100 transfer cask top, bottom, or ram access covers.

RSI 3-2 Revise the Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems to define the sample size of the exterior inspections of the concrete storage casks.

The Reinforced Concrete Structures AMPs include visual inspections of exterior concrete surfaces; however, the AMPs are not clear on whether the exterior inspections will be performed on all casks or some smaller sample size.

Revise the AMPs to define the number of casks inspected and, if not all casks will be inspected, provide the technical basis for using a smaller sample size for the exterior inspections.

This information is needed to determine compliance with 10 CFR 72.240(c)(3).

Response to RSI 3-2

The Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems have been revised to state that the exterior inspection of the readily accessible concrete storage cask surfaces applies to each loaded cask in operation during the extended period of storage. All casks in operation will be inspected at least once every five years and there is no sampling associated with this exterior concrete inspection. Note that Chapter 6, Evaluation Frequency, of ACI 349.3R-02 states that: "All safety related structures should be visually inspected at intervals not to exceed 10 years." Inspecting all loaded casks every five years during the period of extended operation is responsive to both the NUREG-2214 guidance that a sample of the storage casks to be inspected every five years and the ACI 349.3R-02 requirement that all safety related storage casks be visually inspected at intervals not to exceed 10 years.

RSI 3-3 Provide the test report(s) that demonstrate that the W110 transfer cask neutron shielding epoxy resin material is not subject to radiation-induced aging effects. Appendix B of the SENTRY™ renewal application summarizes the basis for why the W110 transfer cask epoxy resin neutron absorber material is not subject to radiation-induced aging (e.g., embrittlement, loss of hydrogen).

Provide the test reports that support the technical basis for concluding that aging effects for the epoxy resin are not credible.

This information is needed to determine compliance with 10 CFR 72.236(d) and 72.240(d).

Response to RSI 3-3

The epoxy-resin neutron absorber material description in SENTRY renewal application Appendix B TLAA B.7 "W110 Transfer Cask Neutron Shielding Thermal Aging, Radiation Embrittlement, and Boron Depletion" was derived from SENTRY SAR Section 8.9.1. The RSI 3-3 statement "epoxy resin material is not subject to radiation-induced aging" is not a complete summary of the way SAR Section 8.9.1 and renewal application TLAA B.7 address the epoxy resin neutron absorber material performance. It would be more accurate to state that the epoxy-resin material is subject to radiation-induced aging effects and was determined to be acceptable for the 60-year W110 transfer cask design life in SENTRY SAR Section 8.9.1 and in renewal application TLAA B.7. Both renewal application TLAA B.7 and SENTRY SAR Section 8.9.1 state that the epoxy-resin neutron shielding material should be inspected for deterioration through dose rate measurements during the period of W110 transfer cask operations.

The SENTRY W110 Transfer Cask AMP has been expanded to include a verification radiation dose rate inspection of the neutron shielding epoxy-resin sidewall material performance on a loaded W110 transfer cask once per loaded fuel canister transfer campaign. This neutron shielding performance verification inspection requirement addresses dose monitoring parameters, methodology, and frequency of activities that will be performed to verify that the SENTRY SAR neutron shielding acceptance criteria are met during the period of extended W110 transfer cask operation. In accordance with the W110 Transfer Cask AMP Element 5, Monitoring and Trending, epoxy resin neutron shielding inspection results are compared to those obtained during previous inspections, so that the progression of degradation can be evaluated and predicted.

OBSERVATIONS

Observation 3-1 In the Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems, clarify the activities that will be used to verify the shielding performance of the concrete storage casks.

The Reinforced Concrete Structures AMPs include visual inspections and radiation surveys; however, it is unclear to the staff which activities are credited for managing the shielding performance of the concrete.

The AMPs' Detection of Aging Effects program elements state that radiation surveys are performed to verify compliance with 10 CFR 72.104 and the Technical Specifications. However, the staff is unable to identify any radiation survey activities that occur in the period of extended operation. In addition, there are no details in the other program elements that describe the surveys, such as the measurement techniques, frequency, locations where radiation is measured, and acceptance criteria, that demonstrate that the surveys are capable of managing the aging of each of the concrete casks.

The AMPs also include visual inspections of the concrete; however, the AMPs are not clear on whether visual inspections are credited for managing shielding effectiveness. NUREG-2214, "Managing Aging Processes in Storage (MAPS) Report," recognizes that visual inspection may be an effective means to monitor shielding effectiveness, provided that the visual inspection acceptance criteria (e.g., depth of spalling, width of cracks) are demonstrated to be sufficiently conservative to ensure that degradation will be identified and corrected prior to a loss of shielding. The AMPs do not provide such a demonstration.

Revise the renewal application to clarify which activities are credited to managing the concrete shielding and, as appropriate, provide the additional details described above that demonstrate the activities are capable of managing the aging of each of the concrete casks.

This information is needed to determine compliance with 10 CFR 72.236(d), 72.240(c)(3), and 72.240(d).

Response to Observation 3-1

The ACI 349.3R-02 FuelSolutions and SENTRY storage cask concrete visual inspections, inspection result evaluations and acceptance criteria (and associated corrective actions or repairs if necessary) will be the primary means of managing and verifying the shielding performance of the storage cask concrete during the period of extended operation. The FuelSolutions and SENTRY Reinforced Concrete Structures AMPs have both been revised to clarify this matter. In accordance with the guidance of NUREG-2214, "Managing Aging Processes in Storage (MAPS) Report," conducting the concrete visual inspections in accordance with ACI 349.3R-02 provides an effective means to monitor concrete shielding effectiveness, and using the three tier ACI 349.3R 02 visual inspection evaluation and acceptance criteria (e.g., depth of spalling, width of cracks) demonstrates that the inspection results will be sufficiently conservative to ensure that concrete degradation will be identified and corrected prior to a loss of shielding.

The FuelSolutions and SENTRY Technical Specification 5.3.5 concrete radiation surveys to verify compliance with 10 CFR 72.104 do not involve any radiation survey activities that occur during the period of extended operation have been removed from the FuelSolutions and SENTRY Reinforced Concrete Structures AMPs.

Observation 3-2 In the Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems, clarify the use of the ACI 349.3R concrete code criteria for the inspection of the internal and external surfaces of the storage cask.

The Reinforced Concrete Structures AMPs include visual inspections to monitor the condition of the concrete. The staff noted potential discrepancies or information gaps as follows:

1. For the cask annular space and interior areas of the vents, the visual inspection acceptance criteria are stated to conform to ACI 349.3R. The application also states that the cask interior surfaces that are covered by a metal liner are addressed by the Metallic Surfaces AMP.

It appears that the entire annular spaces of the FuelSolutions™ and SENTRY™ storage casks are metallic. In addition, the interior vent areas for the SENTRY™ cask are also metallic. As a result, it is unclear which portions of those areas would be subject to the ACI 349.3R concrete code criteria.

2. For the cask exterior, the Detection of Aging Effects program element does not specifically state a code or standard for the visual inspections of the exposed concrete (unlike the annular space criteria described above). Clarify whether the inspections for the cask exterior will conform to ACI 349.3R or some other criteria.
3. The Detection of Aging Effects program element states that inspectors are qualified to ACI 349. It is unclear to the staff if this reference was intended to be ACI 349.3R, which is referenced in the acceptance criteria and defines the qualification requirements in Chapter 7 of that code.

Revise the Reinforced Concrete Structures AMPs, as appropriate, to clarify these details for the annular space and exterior inspections.

This information is needed to determine compliance with 10 CFR 72.240(c)(3).

Response to Observation 3-2

The Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems have been revised to clarify the use of the ACI 349.3R concrete code criteria for the inspection of the internal and external surfaces of the storage cask as follows:

1. The entire annular space and the inlet and outlet vents of the SENTRY storage casks are lined with metallic plating and there are no concrete surfaces to be inspected using ACI 349.3R. The SENTRY Reinforced Concrete Structures AMP has been revised to remove the SENTRY storage cask internal concrete inspection using ACI 349.3R. While the annular space and the outlet vents of the FuelSolutions storage casks are lined with metallic plating, the inlet vent areas at the bottom of the FuelSolutions

storage casks do not have a metallic lining and have exposed concrete surfaces. The exposed internal concrete surfaces on the FuelSolutions lead cask (cask housing the canister inspected at 5 year intervals) will be visually inspected every five years using ACI 349.3R. The FuelSolutions Reinforced Concrete Structures AMP has been revised to state that the inspection of the internal lower vent area of the one lead FuelSolutions cask uses the ACI 349.3R concrete inspection criteria.

2. The Detection of Aging Effects program Element 4 in the Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems have been revised to state that the visual inspections for the storage cask exterior concrete will conform to the evaluation and acceptance criteria of ACI 349.3R.
3. The Detection of Aging Effects program Element 4 in the Reinforced Concrete Structures AMPs for the FuelSolutions™ and SENTRY™ systems have been revised to state that the visual inspections for the storage cask exterior concrete will be performed by personnel qualified to the requirements in Chapter 7 of ACI 349.3R.