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Our ref: LTR-NRC-19-1

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Subject: Reply to Notice of Nonconformance Cited in NRC Inspection Report No. 99901408/2018-201 Dated December 3, 2018

Westinghouse acknowledges receipt of NRC Inspection Report Number 99901408/2018-201 dated December 3, 2018 and the issuance of Notices of Nonconformance: 99901408/2018-201-01, 99901408/2018-201-02. Westinghouse takes any Notice of Nonconformance received from the NRC seriously, is taking appropriate actions to resolve these issues, and is committed to comply with the provisions of Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocess Plants," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities" and 10 CFR Part 21, "Reporting of Defects and Noncompliance." Westinghouse also values the results from this review of the Westinghouse implementation of quality activities associated with oversight of suppliers, the resolution of technical issues, and our corrective action program.

As requested, details of the corrective actions associated with these nonconformance issues are described in the attachment to this letter.

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Nonconformance 99901408/2018-201-01

Criterion IX, "Control of Special Processes," of Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50, "Domestic Licensing of Production and Utilization Facilities," states that "Measures shall be established to assure that special processes, including welding, heat treating, and nondestructive testing, are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements."

Section 6.0 of WES' [Westinghouse Electric Sweden's] procedure BFE 13-110, "Handling of Filler Metal," Revision 1, dated June 14, 2014, states that "Dirt and unintentional coating on MIG/MAG, as well as TIG rod can result in porosity and other quality issues." In addition, Section 7.1 of BFE 13-110 states that "Only electrode material and filler material that is being used on an in-process welding work is stored at the welding station. It is important that only the current electrode and filler material for the current WPS be stored at the workstation." Furthermore, Section 7.5 of BFE 13-110 states that "Storage of rods shall be done without contact with water and moisture. The rod surfaces shall be protected from oil, grease, rust or other particles that attract moisture."

Paragraph 4.5 of WES' procedure QMS-A, "Quality Management System," Revision 7, dated August 23, 2013, states that "Procedures are established to specify the methods and extent of identification and traceability of items to ensure that only correct and acceptable items are installed or used in items and services." In addition, paragraph 4.5.2 of QMS-A states that "Identification of items is maintained, as necessary, to provide confidence that the correct items are used." Furthermore, paragraph 4.5.3 of QMS-A states that "Items including consumable materials and items identified as having limited calendar, shelf, or operating lives or cycles are traceable and controlled. The loss of identification on traceable items is documented and the items dispositioned in accordance with established procedures."

Contrary to the above, as of October 19, 2018, WES failed to assure that special processes were controlled and accomplished using qualified procedures in accordance with specifications and acceptance criteria. Specifically, the NRC inspection team observed filler metal rods in numerous work stations in the workshop hanging from various welding fixtures scattered throughout the workshop, and also found filler metal rods hanging from an air supply pipe in the liquid penetrant inspection booth where there was washing/hosing of penetrant with water, as well as spraying of developer and penetrant. The NRC inspection team also noted that filler metal rods in the work stations were not marked with the heat or lot number. Because filler metal rods kept in an unlocked rack in the workshop had filler metal boxes of multiple heats, no objective evidence existed to determine the heat or lot number for the filler metal rods stored in each of the different workstations. When asked for the requirements for handling the filler metal rods, the welder and/or his supervisor were not aware of the specific requirements or about the existence of WES' procedure BFE 13-110. These filler metal rods were used to weld the control rod blades for the Brunswick Steam Electric Plant, Units 1 and 2 (hereafter referred to as Brunswick). Proper control of filler metal rods is necessary to assure that each heat of material is documented in the associated traveler/routing as well as to avoid contamination and the introduction of detrimental material to the final product which could cause degradation (i.e., cracking) that could potentially result in the component not performing its intended safety function.

Westinghouse Response:

Westinghouse has created issue report IR-2018-17755 in our Corrective Actions Program to track the issue and completion of the suggested corrective action plan.

1) **The reason for the noncompliance or, if contested, the basis for disputing the noncompliance:**
   A limited cause analysis has been performed and identified the following cause:

Cause:

Inadequate procedural requirements with regards to filler material control and inadequate knowledge at the workshop about the procedure requirements.

Basis:

The cause analysis reviewed the identified concern about lack of procedural awareness raised by NRC and concluded through interviews with control rod workshop manager (new in the position), welder, welding engineer that inadequate procedure training (of filler material control requirements) has been given to the workshop manager and welder.

The filler material control procedure does not provide sufficient level of requirements to guide the works to control the material in a sufficient manner. For example:

- the procedure states that welding wire shall be stored so that no contact with water or humidity exists, but does not restrict that welding wire should not be left in the liquid penetrant room, potentially exposed, between welding activities,
- the procedure do not provide guidance for which end to start welding to ensure traceability to material lot number is kept until the wire has been completely used.

2) The corrective steps that have been taken and the results achieved:

An assessment of the condition adverse to quality has been performed. WSE has reviewed the identified concern of the risk of potential contamination and introduction of detrimental material, and concluded that filler material should not be left in the liquid penetrant room between welding activities. The review also concluded that proper barriers have been in place to identify if a weld is contaminated. The welding station in the liquid penetrant room is only used for weld repair followed by visual inspection, NDT PT-testing, heat treatment of the Absorber Cross and another visual inspection. The barriers in place together with WSE operating experience of the control rods provide reasonable assurance of the weld quality and that the inspections in place would identify a contaminated weld. WSE has also verified that none of the filler materials types used in the U.S. projects have expiration dates with limited shelf time. WSE has reviewed the identified concern of material control and traceability which was raised by NRC and concluded that the risk for mixing filler material is low based on the following:

- Westinghouse fuel factory has restricted access including in-processing through security. Visitors must always be escorted by a Westinghouse employee when accessing workshops.
- The control rod workshop is operating on its own. Only control rods are being manufactured at the workshop, the filler material used for the control rods is allocated for that particular workshop. The filler material is not transferred between different workshops.
- There is an established storage location (rack) in the control rod workshop where filler material is being stored in their boxes. When all filler material of a lot has been used, new material is retrieved from the main storage at goods receiving. The control rod storage rack is also recognized in WSEs SAP system as a storage location to ensure traceability to available filler material batches and keeps count on available amount. The racks also are marked with the WSE batch no.
- The same experienced welder performs the welding in all of the welding stations in the control rod workshop which decrees the risk of mixing material since no shift-turnover is performed between two individuals.
- Limited number and types of welding material is used to weld the Control Rod. Only three welding material are used to weld the Brunswick project. The filler metals are of different material type (316L-Si/SKR-Si, 316L/SKR, NiCr-3), brands (two fabricates) and appearance (1 m wire rod/electrode, wire on spool). This minimizes the risk that material has been mixed.

- The consumption of welding material is low so the same material lot/heat is used for several years which minimize the risk for mixing filler material types and lots/heats.
- The heat/lot number is marked only on one side of the welding material. The risk observed is that the welding could be started from the end of the filler material where the lot/heat number is located, which increases risk for potentially loose traceability to lot/heat no. of the wire between welding activities. However the routine used by the welder is to scrap and use another rod/wire if uncertainties would occur. The material type is stamped on both ends so the welder can identify 316L vs. NiCr-3 material type.
- Prior to start welding, the welder verifies that the filler material type and batch is accurate which is acknowledged by sign-off in the Manufacturing system to ensure traceability to used filler material. Only the filler material for the ongoing welding is brought to the welding station. Once the welding is completed it is returned to the storage rack.

As a result of the finding identified by NRC following interim compensatory actions have been taken:

- A workshop walk-down has been performed by the Welding Engineer together with the welder to verify and confirm that only applicable weld filler material for the ongoing project is maintained at the work station.
- The welding material in the liquid penetrant room has been removed.
- Welding material stored in the control rod workshop storage rack but not used for the ongoing project has been removed and sent back to the main storage at goods receiving.
- The welder has been instructed to only bend the filler material end with the material number and always start welding on the end without lot number.

The compensatory actions completed above are judged to be sufficient to control the filler material while the corrective action plan items are being implemented.

3) The corrective steps that will be taken to avoid noncompliance:
Corrective action #1: Revise procedure BFE 13-110 to provide clearer requirements to control the filler material control and include the following:

- That bending of filler material wire is performed on the correct end of the rod/wire.
- Correct filler wire batch is verified before placing it in the control rod “storage” (rack) in the workshop.
- That all filler material batches are exchanged when a new batch/lot of same type is introduced in the workshop. Only one batch/lot of same type should be available in the workshop.
- No filler material is being maintained in a location with increased risk of contamination between welding activities, e.g., in the penetrant room.

Corrective Action #2: Revise the operating work instructions for the Control Rod workshop to include that filler material shall be handled in accordance with procedure BFE 13-110.

Corrective Action #3: Perform training of revised procedure (BFE 13-110) to manager and welding operators at in the control rod workshop. The managers and welders shall also be put on distribution list for any future procedure revision for future procedure changes requiring training.

Corrective Action #4: Welding Engineer shall perform and document a completed surveillance in the control rod workshop to verify that filler material is being controlled in accordance with the revised procedures and requirements.

4) The date when the corrective action (CA) will be completed:

CA1) Revise procedure BFE 13-110	Due date: March 15, 2019
CA2) Revise Control Rod work instruction(s)	Due date: April 15, 2019
CA3) Perform training of revised procedure(s)	Due date: April 30, 2019
CA4) Perform a Surveillance focused on filler material control	Due date: May 31, 2019

Nonconformance 99901408/2018-201-02

Criterion X "Inspection," of Appendix B to 10 CFR Part 50 states, in part, that "A program for inspection of activities affecting quality shall be established and executed by or for the organization performing the activity to verify conformance with the documented instructions, procedures, and drawings for accomplishing the activity. Such inspection shall be performed by individuals other than those who performed the activity being inspected. Examinations, measurements, or tests of material or products processed shall be performed for each work operation where necessary to assure quality. If inspection of processed material or products is impossible or disadvantageous, indirect control by monitoring processing methods, equipment, and personnel shall be provided."

WES' drawing No. 336028, "Absorber Cross," Revision 0, dated November 3, 2011, specifies a root gap acceptance criteria of 0.5 mm to 2.0 mm for welding the absorber cross to the velocity limiter. Section 5.2 of WES' Quality Management System, Revision 7, dated August 27, 2013, states that "Inspection and testing are performed on both purchased and manufactured items, as applicable, to verify compliance with acceptance criteria. For safety-related items and services, inspections or tests will be performed by qualified personnel who are independent of those performing the work."

Contrary to the above, as of October 19, 2018, WES failed to execute an inspection of an activity affecting quality to verify conformance with the drawing and failed to ensure that the inspection was performed by an individual other than the one who performed the activity being inspected. Specifically, WES did not inspect the fit-up of weld No. 101407 for welding the absorber cross to the velocity limiter of the control rod blades for Brunswick to verify that the dimension of the root gap was within the drawing specifications using an appropriate measuring device or gauge. Instead, the welder relied on visual estimation, based on experience only, to determine if the root gap met the required dimensions. Only after the NRC inspection team requested that the root gap be verified by an appropriate measuring device or gauge, the welder proceeded to use a calibrated 2 mm gauge to determine if the root gap was within the qualified range of 0.5 mm to 2 mm. Using the 2 mm gauge, the welder easily inserted the gauge in the root gap, which meant that the root gap exceeded the maximum qualified range of 2 mm. In addition, this dimension was not verified by the Quality Control inspector to ensure that the drawing specifications were met prior to welding. Confirming that root gaps meet the required dimensions from the drawing specifications is necessary to ensure that the welder and/or the weld procedure are properly qualified. Since weld procedures are qualified using production duplicates, dimensional deviations from those qualified can affect the overall quality, dimensions, and safety function of the control rod blade.

Westinghouse response:

Westinghouse has created issue report IR-2018-17670 in our Corrective Actions Program to track the issue and completion of the suggested corrective action plan.

1) The reason for the noncompliance or, if contested, the basis for disputing the noncompliance:
Westinghouse is not contesting the noncompliance but is providing clarification to parts of the issue raised by NRC (as described below) and documented in the inspection report (report no. 99901408/2018-201):
"WES' drawing No. 336028, "Absorber Cross," Revision 0, dated November 3, 2011, specifies a root gap acceptance criteria of 0.5 mm to 2.0 mm for welding the absorber cross to the velocity limiter."

WSE response: The drawing does not contain any limitations or requirement on root gap thus it is not a design or drawing requirement. The root gap limit is stated in the Welding Procedure Specification (WPS 172) and is a production process control limit. It is not clearly described that it is limits to provide guidance for the welder.

"WES failed to execute an inspection of an activity affecting quality to verify conformance with the drawing and failed to ensure that the inspection was performed by an individual other than the one who performed the activity being inspected."

WSE response: The root gap criterion of 0.5 mm to 2.0 mm is a production process control limit, and is not required to be verified by an independent quality inspector. The total length of the absorber cross assembly is a drawing requirement, which is 100% verified as quality control inspection performed a by qualified and independent inspector.

"Specifically, WES did not inspect the fit-up of weld No. 101407 for welding the absorber cross to the velocity limiter of the control rod blades for Brunswick to verify that the dimension of the root gap was within the drawing specifications using an appropriate measuring device or gauge. "

Instead, the welder relied on visual estimation, based on experience only, to determine if the root gap met the required dimensions."

WSE response: The Welding Procedure Specification (WPS 172) provides the production process control limit as 0.5 to 2.0 mm. Information provided by the welder (during interview after the inspection) is that the weld result is improved when the root gap set closer to 2.0 mm, which is normally verified by the welder by using a filler material wire of 1.6 mm diameter. On this occasion the root gap was measured to exceed the limits by 0.1 mm (total gap of 2.1 mm). The Qualification report shows that 3.0 mm has been used during welding qualification and as mentioned above the limits are established as production process control limit. The important design requirement is the total length of the velocity limiter welded on to the absorber cross. Also note that the weld is 100% tested by NDT RT.

"Only after the NRC inspection team requested that the root gap be verified by an appropriate measuring device or gauge, the welder proceeded to use a calibrated 2 mm gauge to determine if the root gap was within the qualified range of 0.5 mm to 2 mm. Using the 2 mm gauge, the welder easily inserted the gauge in the root gap, which meant that the root gap exceeded the maximum qualified range of 2 mm."

WSE response: Even though it is a production process control limit the welder operator should have access to and use proper M&TE to verify that he/she is within those limits.

"In addition, this dimension was not verified by the Quality Control inspector to ensure that the drawing specifications were met prior to welding. Confirming that root gaps meet the required dimensions from the drawing specifications is necessary to ensure that the welder and/or the weld procedure are properly qualified. Since weld procedures are qualified using production duplicates, dimensional deviations from those qualified can affect the overall quality, dimensions, and safety function of the control rod blade."

WSE response: As explained above the limits identified in the WPS are production process control limit which do not require a qualified inspector to verify. WSE has concluded that this issue has no impact on product quality or safety function of the control rod blade since all drawing requirements and qualified conditions have been met and verified through ordinary quality inspections.

The limited cause analysis performed concluded the following cause(s):

Cause 1:
Inadequate information provided in the WPS.

Basis:
The WPS does not clarify that the defined limit is a production process control limit and not a design or qualified weld parameter.

Cause 2:
Proper Measuring & Test Equipment (M&TE) was not implemented at the work station to verify the production process control limit prior to starting welding.

Basis:
The welder used the diameter of a welding wire instead of a calibrated standard when setting up the root gap prior to welding.

2) The corrective steps that have been taken and the results achieved:
Interim Action: Review of the associated requirements (drawing, WPS, Qualification Report) have been performed and concluded that the root gap requirement is a production process control limit. The Welding Procedure Specification (WPS 172) will be revised to clarify that the root gap dimension is a process limit to avoid misunderstanding.

3) The corrective steps that will be taken to avoid noncompliance:
Corrective Action #1: Revise WPS 172 to clarify that the root gap is production process control limit.

Corrective Action #2: Review other WPS associated with U.S. Control Rod manufacturing and assess if there are other process control limits defined where the WPS needs to be clarified or M&TE gauge implemented at the work station.

Corrective action #3: Revise identified WPS (from Corrective action No 2) which needs clarification of production process control limits.

Corrective Action #4: Implement suitable M&TE gauge to be used by the welder when setting up the root gap or verifying other production process control limits. Ensure the M&TE is included in the M&TE-register and calibrated according to standard routines.

Corrective Action #5: Issue an lessons learned to be shared with all workshops performing welding operations top highlight the importance of how quality limits or production process control limits are being verified and the importance of using suitable methods depending on the application.

4) The date when the corrective action will be completed:

CA1) Revise the welding procedure (WPS 172)	Due date: February 28, 2019
CA2) Completed review of WPS used for U.S. Control Rod welding	Due date: March 31, 2019
CA3) Revise WPS as deemed necessary from CA2	Due date: April 30, 2019
CA4) Implement gauge(s) at the work station(s)	Due date: March 31, 2019
CA5) Create and issue a lesson learned	Due date: February 15, 2019