



April 13, 2020

OG-20-113

To: PWROG Executive Committee Members

Subject: PWR Owners Group
NEI 03-08 Needed and Good Practice Guidance: Thermal Sleeve Cross-Sectional Failure – Westinghouse Nuclear Safety Advisory Letter NSAL-20-1

References:

1. Westinghouse Nuclear Safety Advisory Letter, NSAL-20-1, “Reactor Vessel Head Control Rod Drive Mechanism Penetration Thermal Sleeve Cross-Sectional Failure”, dated February 14, 2020.
2. Westinghouse Nuclear Safety Advisory Letter, NSAL-18-1, “Thermal Sleeve Flange Wear Leads to Stuck Control Rod”, dated July 9, 2018.
3. NEI-03-08, Revision 3, “Guideline for the Management of Materials Issues,” dated February 2017.

The purpose of this letter is to issue Interim Guidance regarding inspection of reactor vessel closure head control rod drive mechanism thermal sleeves for cross-sectional cracking. As discussed in Westinghouse Nuclear Safety Advisory Letter NSAL-20-1, “Reactor Vessel Head Control Rod Drive Mechanism Penetration Thermal Sleeve Cross-Sectional Failure” [1], operational experience (OE) from an international plant reveals the potential for cross-sectional cracking of a specific design of thermal sleeves. While the OE did not result in the inability to insert control rods at the affected units, this condition, when combined with enough flange wear, discussed in NSAL-18-1 [2], has the potential to impede control rod insertion.

There are both “Needed” and “Good Practice” elements of the guidance documented herein as defined in NEI-03-08 [3]. The “Needed” elements of the guidance are actions addressing the potentially safety related aspects of the OE while the “Good Practice” elements outline proactive measures that can be taken in support of asset preservation. It is important to note that while the NSAL primarily addresses the safety significance of combined thermal sleeve cracking and flange wear, cracking and thermal sleeve failure can still occur with flange wear below the criterion. While this does not represent a safety significant issue, it can result in the need for emergent utility action to conduct a replacement or repair.

Per the NEI-03-08 [3] guidelines, expected utility actions are classified as to relative level of importance:

- Mandatory – to be implemented at all plants where applicable
- Needed – to be implemented whenever possible but alternative approaches are acceptable

- Good Practice – implementation is expected to provide significant operational and reliability benefits, but the extent of use is at the discretion of the individual plant/utility.

This guidance is effective at all impacted US PWR units as of July 1, 2020. Completed actions in accordance with NSAL-20-1 recommendations prior to issuance of this interim guidance are considered acceptable for meeting the requirements herein. Note that as additional operating experience and other data are gathered, further guidance with revised requirements for thermal sleeve cracking inspections may be appropriate. Utility owners should continue to monitor industry developments.

The guidance was developed and approved by the PWROG utility members and PMMP-EC/PWROG-EC members to provide immediate guidance for the Table 1 plants as defined in the Westinghouse NSAL-20-1. This is the first step in the development of broader guidance for the fleet in response to the recent operating experience.

Interim Guidance:

NEI-03-08 “Needed” Guidance:

- 1) Units defined in Table 1 of NSAL-20-1 [1] shall perform visual examinations outlined in the “RECOMMENDED ACTIONS” section of NSAL-20-1. As a modification to the “RECOMMENDED ACTIONS” in NSAL-20-1, Visual exams shall be conducted using a VT-1 quality inspection.

NEI-03-08 “Good Practice” Guidance:

As previously mentioned, cracking and thermal sleeve failure can still occur with flange wear below the 0.8-inch criterion specified in the NSAL. While this does not represent a safety significant issue, it can result in the need for emergent utility action to conduct a replacement or repair. Due to uncertainties in actual flange wear rates and some observed variation of these wear rates over time, utilities should take a judicious approach when projecting future inspection scope and timing for detecting this cracking mechanism. As more inspection and measurement data is acquired and assimilated, it is expected that the PWROG will be able to establish more prescriptive guidance for reinspection. As such, the following “good practice” guidance is recommended to provide utilities with some proactive measures that can be taken in support of asset preservation.

- 1) Plants listed in Table 1 of NSAL-20-1 should consider including additional thermal sleeves in their visual inspection scope beyond those locations currently required for examination due to the 0.8 inch lowering criterion. It is recommended that any additional thermal sleeves inspected be biased to locations near the center of the head as this is consistent with the OE which showed a higher concentration cracks at sleeves located toward the center of the head. Consideration should also be given to choosing thermal sleeves exhibiting greater amounts of flange wear.
- 2) All plants listed in Table 1 of NSAL-20-1 should review their reactor services procedures to see if it includes a note to look for components, such as thermal sleeves, that have separated and fallen out of the head each time it is removed. If this clarification is not included, it is recommended that it be added to minimize the potential to miss separated thermal sleeves in the early stages of the outage.

International (non-US) Plants with Non-Westinghouse Replacement Heads:

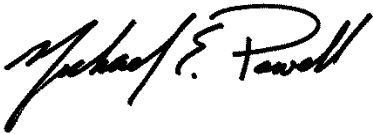
For the international (or non-US) plants that are not identified in Table 1 of NSAL-20-1 [1] which operate with a reactor vessel head that is not designed by Westinghouse and still meet both design features or criteria:

- Operate with higher upper head bypass flow conditions, known as T-cold head plants
- Operate with thermal sleeves containing a collar just below the flange

It is suggested that these affected plants contact their respective reactor vessel head designers to evaluate applicability of NSAL-20-1 and recommended actions with respect to the design of their thermal sleeves.

If you have any questions, please do not hesitate to contact me at (602) 999-2080. You may also contact the Westinghouse Point of Contact, Bryan Wilson at (412) 374-3281, or Jim Molkenhuth, Program Director of the PWR Owners Group Materials Committee at (860) 384-9092.

Sincerely yours,

A handwritten signature in black ink, appearing to read "Michael E. Powell". The signature is fluid and cursive, with the first name "Michael" and last name "Powell" being the most legible parts.

Michael Powell, Chief Operating Officer and Chairman
PWR Owners Group

JPM:MP:am

cc: PWROG PMO
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Enclosure: Westinghouse Nuclear Safety Advisory Letter NSAL-20-1