



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 6, 2018

Mr. Tim Hanley, Chairman
ATTN: Debbie Rouse
BWR Vessel and Internals Project
1300 West W.T. Harris Boulevard (Building 1)
Charlotte, NC 28262

SUBJECT: FINAL SUPPLEMENTAL SAFETY EVALUATION RELATED TO BWRVIP-62-A,
"BOILING WATER REACTOR VESSEL AND INTERNALS PROJECT,
TECHNICAL BASIS FOR INSPECTION RELIEF FOR BWR INTERNAL
COMPONENTS WITH HYDROGEN INJECTION," USE OF ONLINE NOBLE
METAL CHEMISTRY IN BOILING WATER REACTORS

Dear Mr. Hanley:

By letter dated January 24, 2018 (Agencywide Documents Access and Management System Accession (ADAMS) No. ML18033A323), the Boiling Water Reactor Vessel and Internals Project (BWRVIP) stated that the BWRVIP had issued the following interim guidance to its members:

U.S. plants utilizing all forms of HWC [hydrogen water chemistry] and crediting HWC shall meet the conditions and limitations of BWRVIP-62-A. In the case of plants utilizing OLNC [online noble metal chemistry], this means they shall meet the Category 3a NMCA [noble metal chemical addition] parameters and implementation steps (including platinum loading) of Tables 3-5 and 3-8. This guidance is issued as NEI 03-08 'Needed' guidance.

The January 24, 2018, letter supplemented information in BWRVIP-62, "BWR Vessel and Internals Project, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection."

By letter dated May 15, 2018, the NRC staff issued its draft safety evaluation (SE) (ADAMS Accession No. ML18107A607).

By letter dated May 31, 2018 (ADAMS Accession No. ML18155A347), the BWRVIP informed the NRC staff that there was no proprietary information, inaccuracies, or needed clarifications in the draft SE.

The NRC staff has found the use of OLNC acceptable subject to the limitations specified in the NRC SE. The final SE defines the basis for our acceptance.

In accordance with the guidance provided on the NRC website, we request that BWRVIP publish approved proprietary and non-proprietary versions of BWRVIP-62 within six months of receipt of this letter. The approved versions shall incorporate this letter and the enclosed final SE after the title page.

If future changes to the NRC's regulatory requirements affect the findings in the NRC staff SE, the BWRVIP will be expected to revise the BWRVIP-62 appropriately. Licensees referencing this BWRVIP-62 would be expected to justify its continued applicability or evaluate their plant using the revised BWRVIP-62.

If you have any questions or require any additional information, please feel free to contact the NRC Project Manager for the review, Joseph Holonich at (301) 415-7297 or Joseph.Holonich@nrc.gov.

Sincerely,

/RA/

Dennis C. Morey, Chief
Licensing Processes Branch
Division of Policy and Rulemaking
Office of Nuclear Reactor Regulation

Docket No.: 99902016

Enclosure:
Final Safety Evaluation

Cc: Mr. Bob Carter
BWR Vessel and Internals Project
1300 West W.T. Harris Boulevard (Building 1)
Charlotte, NC 28262

SUBJECT: FINAL SUPPLEMENTAL SAFETY EVALUATION RELATED TO BWRVIP-62-A, "BOILING WATER REACTOR VESSEL AND INTERNALS PROJECT, TECHNICAL BASIS FOR INSPECTION RELIEF FOR BWR INTERNAL COMPONENTS WITH HYDROGEN INJECTION," USE OF ONLINE NOBLE METAL CHEMISTRY IN BOILING WATER REACTORS DATED JULY 6, 2018

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NRR-106

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SUPPLEMENTAL FINAL SAFETY EVALUATION
BY THE OFFICE OF NUCLEAR REACTOR REGULATION ON
BOILING WATER REACTOR VESSEL AND INTERNALS PROJECT
REPORT TOPICAL REPORT-108705 (BWRVIP-62): "BWR VESSEL AND INTERNALS
PROJECT, TECHNICAL BASIS FOR INSPECTION RELIEF FOR BWR
INTERNAL COMPONENTS WITH HYDROGEN INJECTION"
USE OF ONLINE NOBLE METAL CHEMISTRY IN BOILING WATER REACTORS
DOCKET NO. 99902016

1.0 INTRODUCTION

By letter dated April 21, 2010, the U.S. Nuclear Regulatory Commission (NRC) staff issued its final safety evaluation (SE) (Ref. 1) of Boiling Water Reactor Vessel and Internals Project (BWRVIP) Topical Report-108705, "BWR Vessel and Internals Project, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection (BWRVIP-62)." By letter dated May 13, 2011, the BWRVIP transmitted to the NRC "BWRVIP-62-A: BWR Vessel and Internals Project, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection," EPRI Technical Report 1021006, November 2010 (Ref. 2). BWRVIP-62-A incorporated changes from responses to NRC staff requests for additional information (RAIs), NRC staff recommendations from its final SE, and other necessary revisions since the original publication of BWRVIP-62. By letter dated February 16, 2012, the NRC staff communicated its final verification of BWRVIP-62-A (Ref. 3).

BWRVIP-62-A accepted for use the noble metal chemical addition (NMCA) process and hydrogen water chemistry (HWC), moderate (HWC-M), as bases for claiming relief from certain BWRVIP inspections. As described in BWRVIP-62-A, NMCA is a process in which noble metal is added in batches to the reactor coolant system during refueling outages, and small amounts of hydrogen are continuously injected during plant operation. The NRC staff SE for BWRVIP-62 accepted for use three criteria that plants applying noble metal chemistry must meet to demonstrate mitigation of Intergranular stress corrosion cracking (IGSCC):

- 1) Measured electrochemical potential (ECP) less than or equal to -230 millivolts (mV).
- 2) Measured hydrogen-to-oxygen molar ratio greater than or equal to 3.
- 3) Measured catalyst loading greater than or equal to a specific proprietary value.

BWRVIP-62-A is referenced by other BWRVIP inspection and evaluation guidelines, and implementation of water chemistry in accordance with BWRVIP-62-A is credited to reduce the inspections identified in those documents.

By letter dated January 24, 2018, (Ref. 4) the BWRVIP stated that the BWRVIP had issued the following interim guidance to its members:

U.S. plants utilizing all forms of HWC and crediting HWC ... shall meet the conditions and limitations of BWRVIP-62-A. In the case of plants utilizing OLNC [online noble metal chemistry], this means they shall meet the Category 3a NMCA parameters and implementation steps (including platinum loading) of Tables 3-5 and 3-8. This guidance is issued as NEI 03-08 'Needed' guidance.

2.0 SUMMARY OF THE BWRVIP-62 REPORT

See Section 2.0 of Reference 1.

3.0 EVALUATION

The NRC staff has reviewed the BWRVIP interim guidance described in the BWRVIP's January 24, 2018, letter to NRC. The OLNC method includes introduction of noble metal periodically during plant operation (Ref. 5). In its review of the acceptability of the use of OLNC to provide noble metal protection, the NRC staff determines:

- 1) The acceptance criteria contained in BWRVIP-62-A are performance criteria which the plant must demonstrate that it meets to reduce the inspections.
- 2) These criteria reflect the condition of the metal/environment interface at the locations specified in BWRVIP-62-A, which controls the susceptibility of the subject component to IGSCC.
- 3) Based on the need to meet these performance criteria, any method to introduce noble metal levels sufficient to meet these criteria will provide reasonable assurance that effective mitigation of IGSCC has been achieved and inspections can be reduced in those areas specified in BWRVIP-62-A.

Because OLNC is one method to introduce noble metal, plant-specific implementation of OLNC which demonstrates conformance with the performance criteria of BWRVIP-62-A can utilize the inspection credit as specified in sources referencing BWRVIP-62-A, consistent with the BWRVIP interim guidance provided in its January 24, 2018, letter to the NRC.

4.0 CONCLUSIONS

The NRC staff concludes that plants which apply OLNC and meet the criteria of a Category 3a plant in BWRVIP-62-A may claim inspection credit afforded by sources that reference BWRVIP-62-A.

5.0 REFERENCES

1. Safety Evaluation for Boiling Water Reactor Vessel and Internals Project (BWRVIP) Topical Report BWRVIP-62, "Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection," EPRI TR-108705, April 21, 2010 (ADAMS Accession No. ML100850009).
2. Project 704, Re-Transmittal of "BWRVIP-62-A: BWR Vessel and Internals Project, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection," May 13, 2011 (ADAMS Accession No. ML111370728).

3. NRC Approval Letter for “BWRVIP-62-A: BWR Vessel and Internals Project, Technical Basis for Inspection Relief for BWR Internal Components with Hydrogen Injection” (TAC No. ME6327), February 16, 2012 (ADAMS Accession No. ML120310164).
4. Electric Power Research Institute - Status of BWRVIP-62 Revision and Inspection Relief for BWR Piping Welds and Internal Components with Hydrogen Injection, January 24, 2018 (ADAMS Accession No. ML18033A323).
5. EPRI Progress Report dated January 2010, “Chemical Mitigation Protects BWR Internals and Could Justify Less-Frequent Inspection Intervals,”
<http://mydocs.epri.com/docs/CorporateDocuments/Newsletters/NUC/2010-01/01c.html>

Principal Contributor: Jeffrey Poehler

Date: July 6, 2018