

# Online Noble Chemistry NRC Supplemental Safety Evaluation

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# Background

- BWRs add hydrogen to the reactor coolant to mitigate intergranular stress corrosion cracking (IGSCC). IGSCC can occur in stainless steel piping components and reactor vessel (RVI) internals components, which may lead to pressure boundary leaks or loss of support function of RVI.
- In the early 2000's, BWRs started adding noble metal (mainly platinum) to the reactor coolant as a catalyst to make the hydrogen more effective. It also allows the use of lower hydrogen concentrations. This is called noble metal chemical application (NMCA).
- In "classic" NMCA, the noble metal is added in a batch during refueling outages.

# Background

- The topical report on NMCA, BWRVIP-62 Rev. 0, was originally submitted in 1998.
- In 2006, BWRs started implementing online noble chemistry (OLNC) in which noble metal is added continuously while the plant is operating. OLNC results in reduced cost due to lower needed noble metal additions and reduced hydrogen use.
- The NRC-approved version of the topical report on NMCA, BWRVIP-62-A, was issued in January 2011.
  - The SE has some conditions and limitations.
  - BWRs could now claim relief from certain BWRVIP inspection guidelines, including RCS piping welds and RVI components.

# Background

- In 2012, the BWRVIP submitted BWRVIP-62, Revision 1, which included both NMCA and OLNC methodologies, to the NRC for review and approval.
- BWRVIP withdrew BWRVIP-62 (2/16/2017), Revision 1 from staff review. Reasons cited included
  - Long time needed to do in-situ testing to answer RAIs;
  - Probable need for another revision to BWRVIP-62.

# Background

- BWRVIP April 18, 2017 status letter to NRC said:
  - Plants are still using BWRVIP-62, Rev. 1,
  - Plants are claiming limited inspection relief,
  - BWRVIP is still gathering data to respond to NRC issues,
  - BWRVIP will issue a revision to BWRVIP-62 in the future (date unspecified).
- NRC letter to the BWRVIP, dated August 24, 2017, stated that BWRVIP-62 Rev 1 was a nonconservative change to NRC accepted guidance, and absent an NRC approval of Rev 1, the NRC was unclear on how the continued use of Rev 1 by plants was consistent with the requirements of GL 88-01/BWRVIP-75 and BWRVIP-94.

# Background

- In response to NRC's August 24, 2017 letter, BWRVIP's January 24, 2018 letter to NRC described interim guidance issued to its members:
  - To claim inspection relief, plants must meet the conditions and limitations of BWRVIP-62-A for Category 3a NMCA parameters, irrespective of the method of platinum addition.
    - These include monitoring the platinum loading, measured electrochemical potential (ECP), and hydrogen-to-oxygen molar ratio.
    - Method of application of platinum is not part of acceptance criteria

# NRC Supplemental SE

- NRC developed a supplemental SE to our SE on BWRVIP-62, Rev. 0, considering information in BWRVIP's 1/24/2018 letter.
- The following observations support approval of the use of OLNC subject to the interim guidance:
  - The BWRVIP-62-A acceptance criteria are performance criteria which the plant must demonstrate that it meets to reduce the inspections.
  - 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.
  - 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
- Whether OLNC is effective at meeting the criteria was not needed to support NRC's conclusions.

# Conclusion

- Supplemental SE concluded that plants which apply OLNC and meet the criteria of a Category 3a plant in BWRVIP-62-A may claim inspection credit afforded by BWR I&E guidelines that reference BWRVIP-62-A.
- Draft supplemental SE sent to EPRI for proprietary review May 15, 2018.
  - ML18107A607 (Letter)
  - Final SE expected 3Q CY 2018.

# Path Forward

- Once final SE is issued, licensees using OLNC will be able to reference supplemental SE to justify inspection credit for the BWRVIP guidelines identified in the interim guidance.
- No other planned NRC activities related to BWRVIP-62.