Nebraska Public Power District
Always there when you need us

NLS2015113
October 21, 2015

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Subject: Response to Nuclear Regulatory Commission Requests for Additional Information for Relief Request for Fifth Ten-Year Inservice Inspection Interval, RI5-02 (TAC No. MF6336)
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:
1. Email from Siva Lingam, U. S. Nuclear Regulatory Commission, to Jim Shaw, Nebraska Public Power District, dated September 16, 2015, "Cooper – 10 CFR 50.55a Requests for Fifth Ten-Year Inservice Inspection Interval, RI5-02 (TAC No. MF6336)"

2. Letter from Oscar A. Limpias, Nebraska Public Power District, to the U.S. Nuclear Regulatory Commission, dated June 9, 2015, "10 CFR 50.55a Requests for Fifth Ten-Year Inservice Inspection Interval" (ML15167A066)

Dear Sir or Madam:

The purpose of this letter is for the Nebraska Public Power District (NPPD) to respond to the Nuclear Regulatory Commission's Requests for Additional Information (RAI) (Reference 1) related to the Cooper Nuclear Station "10 CFR 50.55a Requests for Fifth Ten-Year Inservice Inspection Interval" (Reference 2).

The responses to the specific RAI questions are provided in the attachment to this letter.

The delivery date for NPPD's response to these RAIs was originally October 16, 2015. Per discussions with Siva Lingam, NRR Project Manager, the date was adjusted to October 22, 2015.

This letter does not contain any new regulatory commitments.

If you have any questions concerning this matter, please contact Jim Shaw, Licensing Manager, at (402) 825-2788.

COOPER NUCLEAR STATION
P.O. Box 98 / Brownville, NE 68321-0098
***Telephone:** (402) 825-3811 / **Fax:** (402) 825-5211*
www.nppd.com

A047
NRR

Sincerely,

Oscar A. Limpias
Vice President - Nuclear
and Chief Nuclear Officer

/dv

Attachment: Response to Nuclear Regulatory Commission Additional Requests for Additional Information for 10 CFR 50.55a Requests for Fifth Ten-Year Inservice Inspection Interval

cc: Regional Administrator w/ attachment
USNRC - Region IV

Cooper Project Manager w/ attachment
USNRC - NRR Project Directorate IV-1

Senior Resident Inspector w/ attachment
USNRC - CNS

NPG Distribution w/o attachment

CNS Records w/ attachment

Attachment

Response to Nuclear Regulatory Commission Additional Requests for Additional Information for 10 CFR 50.55a Requests for Fifth Ten-Year Inservice Inspection Interval

Cooper Nuclear Station, Docket No. 50-298, DPR-46

The Nuclear Regulatory Commission (NRC) additional requests for additional information (RAI) regarding the 10 CFR 50.55a Request for Fifth Ten-Year Inservice Inspection Interval are shown in italics. The Nebraska Public Power District (NPPD) responses to the requests are shown in normal font.

RAI-1

The NRC staff reviewed the submittal dated June 9, 2015, which included previous inspections of the reactor vessel internals (RVI) components at CNS and requests the following information:

(a) The staff requests that the licensee identify whether the following type of welds were inspected thus far at CNS: (1) furnace sensitized stainless steel vessel attachment welds, and/or (2) vessel attachment welds made with nickel base alloy –182 welding electrodes. If these welds were inspected in the past, provide a brief summary of the inspection results.

(b) Welds made with nickel base alloy (182 welding electrodes) are more susceptible to intergranular stress corrosion cracking (IGSCC) than stainless steel welds. Therefore, the staff requests that the licensee provide information if any of the welds of the RVI components using 182 electrodes - (both ASME Section XI welds and/or non- ASME Section XI welds) were inspected thus far at CNS. If they were inspected, the licensee is requested to provide a brief summary of the inspection results.

(c) Confirm whether core shroud welds were ever repaired at CNS.

NPPD Response

(a) The following table identifies vessel attachment welds fabricated from either E-308/E-309 (furnace-sensitized) or Inconel 182:

Vessel Attachment Welds (Weld No.'s)	Weld Filler Material	Inspections Performed to date Code B-N-2/BWRVIP	Results
Core Spray brackets (5-247, 6-247) (10-247)	Inconel 182 E-308	VT-3/EVT-1	Non-Relevant Indication (NRI)
Surveillance Capsule brackets upper and lower (12-247,13-247)	Inconel 182	VT-1/VT-1	NRI

Feedwater sparger brackets (3-247, 4-247)	Inconel 182	VT-3/EVT-1	NRI
Steam Dryer support lug (7-247,8-247)	Inconel 182	VT-3/EVT-1	NRI
Guide rod bracket (1-247,2-247)	Inconel 182	VT-3/VT-3	NRI
Jet Pump riser brace brackets (10-233)	E-308/E-309	VT-1/EVT-1	NRI

(b) See response to RAI-1(a) above.

(c) The Cooper Nuclear Station (CNS) shroud is considered a Category C un-repaired shroud per BWRVIP-76.

RAI-2

The licensee is requested to provide information whether it continues to implement the addition of the hydrogen water chemistry (HWC) and/or HWC+ noble metal chemical addition (NMCA) as a mitigation technique in reducing the IGSCC growth rates in the reactor vessel at CNS. Provide details on the methods for determining the effectiveness of HWC/NMCA by using the following parameters:

(a) Latest measured values of electro chemical potential – applicable to HWC or HWC+NMCA,

(b) Latest measured values of hydrogen /oxygen molar ratio—applicable if HWC+NMCA method is implemented, and,

(c) Latest measured values of catalyst loading (platinum) applicable to HWC+ NMCA

Many BWR units have implemented the newly developed on-line noble chemical (OLNC) addition to their reactor vessels. If OLNC was implemented at CNS, the staff requests that the licensee provide the latest measured values for the aforementioned items (a) and (b).

Provide the availability of HWC/ HWC+NMCA during the normal operation of CNS. Additionally, provide information regarding the time of implementation of HWC/NMCA or HWC/OLNC at CNS.

NPPD Response

(a) HWC or HWC+NMCA is not applicable as CNS utilizes OLNC addition. The most current Electrochemical Potential (ECP) as measured on 10/12/15 was -486 mV(Standard Hydrogen Electrode [SHE]). The Cycle 29 to date measured ECP is -486 mV(SHE).

(b) HWC+NMCA is not applicable as CNS utilizes OLNC addition. CNS does not measure molar ratio but calculates the value using BWRVIP-202, BWRVIA, for Radiolysis and ECP Analysis, Version 3.1. Three values are developed at the beginning of the cycle: BOC (Beginning of Cycle), MOC (Middle of Cycle) and EOC (End of Cycle). The values selected are from the upper downcomer location which is considered the most conservative location by the BWRVIP. These three values are listed below:

BOC Molar Ratio – 4.683
MOC Molar Ratio – 4.331
EOC Molar Ratio – 3.954

(c) CNS utilizes OLNC, therefore catalyst loading is not applicable.

The availability of HWC/HWC+NMCA during normal operations is listed below:

- Cycle 22, 86.7% HWC availability
- Cycle 23, 96.8% HWC availability
- Cycle 24, 98.3% HWC availability
- Cycle 25, 97.5% HWC availability
- Cycle 26, 97.5% HWC availability
- Cycle 27, 98.1 % HWC availability
- Cycle 28, 99.2% HWC availability
- Cycle 29 to date, 98.7% HWC availability

CNS implementation milestones were as follows:

Date	Milestone
March 2000	First NMCA Application
August 2003	HWC Injection
January 2005	Second NMCA Application
February 2010	First OLNC Application
August 2011	Second OLNC Application
April 2013	Third OLNC Application
April 2014	Fourth OLNC Application
April 2015	Fifth OLNC Application

CNS intends to continue the use of OLNC in conjunction with hydrogen injection to mitigate intergranular stress corrosion cracking of the reactor vessel internals.

RAI-3

Confirm whether a plant-specific leakage assessment was performed, as required by BWRVIP-18, BWRVIP-41, and, BWRVIP-76 for the internals at CNS that accounts for the leakage from all

internals that impact the ability to cool the core and maintain peak clad temperature (PCT) within allowed limits during postulated loss of coolant accidents. Provide a summary of all internal components included in the leakage assessment along with a summary of the following for each component:

(a) the number and length of all cracks detected in past examinations for the component

(b) the number and length of all cracks evaluated in the leakage assessment

(c) the calculated leak rate from each crack evaluated in the leakage assessment.

Confirm whether a plant-specific integrated leakage assessment (if any) associated with the aforementioned RVI components was performed at CNS.

NPPD Response

Responses for RAI-3 questions (a), (b), and (c) are summarized in the table below. Leakage is assumed for the flaws in the Core Spray P1, P8a, and P8b welds along with the DF-1 weld in jet pump 14 because these flaws cannot be depth sized with current inspection technology. No crack growth has been observed based on previous multiple examinations.

Component	**RAI-3(a) Length of flaw detected in past exams (includes measurement uncertainty as applicable)**	**RAI-3(b) Crack length evaluated in leakage assessment (includes assumed crack growth, and assuming flaws in uninspected region as applicable per the respective BWRVIP documents)**	**RAI-3(c) Calculated leak rate evaluated in leakage assessment (until next re-inspection, months)**
Core Spray P1 weld (Loop A)	2.35 inches	15.47 inches (assumes additional flaw length in uninspected region of the P1 weld plus postulated crack growth until next examination)	34.83 gallons per minute (gpm) (24 months)
Core Spray P8b weld (Loop A)	9.35 inches	16.35 inches	29.52 gpm (48 months)
Core Spray P8a weld (Loop B)	1.73 inches	5.23 inches	9.44 gpm (48 months)
Jet Pump 14 DF-1	1.94 inches	4.0 inches	24 gpm (24 months)

Core Shroud	CNS has not detected any shroud through-wall flaws based on the last BWRVIP-76 examination performed in fall of 2014 (RE28). Based on BWRVIP-76, Rev 1-A, Section 2.2.1, a leakage evaluation is not required unless through-wall cracking is observed during inspections.

General Electric - Hitachi has performed a proprietary, CNS plant specific, integrated leakage assessment considering the flaws in the Core Spray piping, jet pump, and core shroud (assuming through-wall cracking). However, the evaluation is currently under review for acceptance in accordance with CNS processes.