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54.17

NLS2009095
November 30, 2009

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

Subject: Response to Request for Additional Information for the Review of Cooper Nuclear Station License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

References:

1. Letter from Tam Tran, U.S. Nuclear Regulatory Commission, to Stewart B. Minahan, Nebraska Public Power District, dated October 29, 2009, "Request for Additional Information for the Review of the Cooper Nuclear Station License Renewal Application (TAC No. MD9763 and MD9737)." (ADAMS Accession Number ML092940414)

2. Letter from Tam Tran, U.S. Nuclear Regulatory Commission, to Stewart B. Minahan, Nebraska Public Power District, dated October 29, 2009, "Request for Additional Information for the Review of the Cooper Nuclear Station License Renewal Application (TAC No. MD9763 and MD9737)." (ADAMS Accession Number ML092920019)

3. Letter from Stewart B. Minahan, Nebraska Public Power District, to U.S. Nuclear Regulatory Commission, dated September 24, 2008, "License Renewal Application" (NLS2008071).

4. Letter from Stewart B. Minahan, Nebraska Public Power District, to U.S. Nuclear Regulatory Commission, dated August 13, 2009, "Response to Request for Additional Information for the Review of the Cooper Nuclear Station License Renewal Application" (NLS2009061).

Dear Sir or Madam:

The purpose of this letter is for the Nebraska Public Power District (NPPD) to respond to the Nuclear Regulatory Commission Requests for Additional Information (RAI) (References 1 and 2) regarding the Cooper Nuclear Station License Renewal Application (LRA) (Reference 3). These responses are provided in Attachments 1 and 2, respectively. Additionally, in a telephone conference call conducted on October 5, 2009, NPPD agreed to provide a supplement to RAI 3.6-1, which was initially responded to in Reference 4, and to make certain clarifying LRA changes. This supplement is provided in Attachment 3, and the requested LRA changes are addressed in Attachment 4, along with the LRA changes associated with Attachments 1 and 2.

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NRR

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

Should you have any questions regarding this submittal, please contact David Bremer, License Renewal Project Manager, at (402) 825-5673.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on NOV 30 2009
(Date)

Sincerely,

Stewart B. Minahan
Vice President – Nuclear and
Chief Nuclear Officer

/wv

Attachments

cc: Regional Administrator w/ attachments
USNRC - Region IV

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

Senior Resident Inspector w/ attachments
USNRC - CNS

Nebraska Health and Human Services w/ attachments
Department of Regulation and Licensure

NPG Distribution w/ attachments

CNS Records w/ attachments

ATTACHMENT 3 LIST OF REGULATORY COMMITMENTS©[4]

Correspondence Number: NLS2009095

The following table identifies those actions committed to by Nebraska Public Power District (NPPD) in this document. Any other actions discussed in the submittal represent intended or planned actions by NPPD. They are described for information only and are not regulatory commitments. Please notify the Licensing Manager at Cooper Nuclear Station of any questions regarding this document or any associated regulatory commitments.

COMMITMENT	COMMITMENT NUMBER	COMMITTED DATE OR OUTAGE
None		

Attachment 1

Response to Request for Additional Information
for License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

The Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) regarding the License Renewal Application (LRA) is shown in italics. The Nebraska Public Power District's (NPPD) response to this RAI is shown in block font.

NRC Request: *RAI 2.3.3.12 AR-4 Air Removal System*

Background

Title 10 of the Code of Federal Regulations Part 54.21(a)(1) (10 CFR 54.21(a)(1)) requires the applicant to provide a list of structures and components subject to an aging management review (AMR).

Issue

a) *In RAI 2.3.3.12 AR-2, dated July 16, 2009, the staff identified in the Updated Safety Analysis Report (USAR), a safety function for main steam line high radiation signal immediately tripping the mechanical vacuum pumps and closing the pumps' inlet and outlet valves in the event of a dropped rod accident. The license renewal application (LRA) does not identify this function under the air removal (AR) system nor do the LRA drawings highlight the flow path. In its response, dated August 17, 2009, the applicant stated that the isolation valves for the mechanical vacuum pumps have an intended function of isolating the vacuum pumps from the main condenser in the event of a dropped rod accident. The applicant added the function to the LRA for the AR system. However, the applicant excluded the isolation valve for the scope of license renewal based on the valve function being completed with moving parts, and the passive pressure boundary provided by the valve bodies was not required to prevent the vacuum pumps from actively discharging air from the condenser through the elevated release point (ERP). Therefore, the applicant's position is that the valves are not subject to an AMR.*

The staff does not agree with the applicant's rational, which excludes the isolation valves from the scope of license renewal and subject to an AMR. In accordance with 10 CFR 54.21, valve bodies are long-lived, passive components that are subject to an AMR. The valve's bodies are an integral part of the pressure boundary and are required to perform the isolation function. In addition, the piping from the condenser to the valves and the associated components are part of the pressure boundary and are required to perform

the isolation function; therefore, they also should be included in scope as passive, long-lived components and subject to an AMR.

b) *In RAI 2.3.3.12-AR-3, a similar issue was identified with the steam jet air ejectors. In the response, the applicant correctly included part of the flow path and valves 'from' the turbine building to the off-gas (OG) building in scope of license renewal and subject to an AMR, but the applicant did not include the flowpath 'inside' the turbine building. The piping and components inside the turbine building are necessary to provide a pressure boundary function to isolate the condenser on a high radiation signal.*

Request

a) *The applicant needs to include the passive, long-lived components necessary to isolate the flow path up to and including the isolation valves for the mechanical vacuum pumps in the scope of license renewal in accordance with the requirement as stated in 10 CFR 54.21; or provide an adequate justification, that is in accordance with the requirements stated in 10 CFR 54.21, for not including the above described components.*

b) *The applicant needs to include the long-lived components from the isolation valves on piping 12" AR-2 up to and including 16" AR-2 holdup line in the scope of license renewal in accordance with the requirement as stated in 10 CFR 54.4(a) or provide an adequate justification why a failure of this piping will not cause a loss of the pressure boundary function on 16' AR-2.*

c) *The applicant needs to include the passive piping and components upstream of piping 48" AR-1 to the condenser in the scope of license renewal in accordance with the requirements as stated in 10 CFR 54.4(a), or provide an adequate justification why a failure of this piping will not cause a loss of the pressure boundary function.*

NPPD Response:

a) To mitigate the consequences of the control rod drop accident (CRDA), the piping and components from the main condenser up to and including the mechanical vacuum pumps' inlet isolation valves (12" 157AV and 12" 158AV, LRA drawing 2009 coordinate F-3) perform a license renewal intended function and are subject to aging management review. Isolation of the mechanical vacuum pumps from the main condenser supports the main condenser function of holdup and plateout for a control rod drop accident since the inlet isolation valves and components between the inlet isolation valves and the main condenser are an extension of the condenser boundary.

b) The 10" AR-2, 12" AR-2, and the 16" AR-2 lines downstream of the mechanical vacuum pumps' outlet isolation valves (10" 159AV and 10" 160AV, LRA drawing 2009 G-4/5)

will be isolated from the main condenser on a high radiation signal by the mechanical vacuum pumps' inlet isolation valves. Therefore, this section of piping is not required to function as part of the main condenser boundary during the control rod drop accident.

However, the 16" AR-2 piping outside the turbine building and attached to the elevated release point (ERP) (1-AR-108-16) is already in scope with the function of preventing a ground-level release during a loss-of coolant accident, in accordance with 10 CFR 54.4(a)(2). Components are added to extend this function into the turbine building back to the mechanical vacuum pump outlet isolation valves (10" 159AV and 10" 160AV) and the gland exhauster inlet check valves (12CV and 13CV, LRA drawing 2009 coordinates G/F-9). A review of these component types, materials and environments determined that these line items are already included in the aging management review of the plant drains systems in LRA Table 3.3.2-12. The gland exhausters and the flex hoses for the gland exhausters are periodically replaced and therefore not subject to aging management review.

c) Piping inside the turbine building upstream of 48" AR-1 to the main condenser, including the steam jet air ejectors (SJAE) and piping in the 1½" AR-1 line to the optimum water chemistry (OWC) system up to normally closed valve AR-115 (LRA Drawing 2009, coordinates E-8/9), has been determined to provide pressure boundary for the air removal system intended function to isolate the SJAEs on a high radiation signal in the CRDA analysis. SJAE flow path components outside the turbine building up to the off-gas (OG) isolation valve (OG-AO-254, LRA drawing 2037 coordinate F-8) were included in the aging management review for the plant drains system in the response to RAI 2.3.3.12 AR-3.

<u>Aging Management Review for Components in Items (a) and (c)</u>

The intended post-accident function of dose reduction (holdup and plateout) for the main condenser is assured through normal plant operation, which requires main condenser pressure boundary integrity to maintain a vacuum. A reduction in main condenser vacuum could indicate degradation in the pressure boundary integrity of the main condenser and would require corrective action prior to loss of intended function. Therefore, for components in the main condenser boundary that support the intended post-accident function of dose reduction (holdup and plateout) for the main condenser, no aging effects require management since normal operation of the plant assures the intended function can be accomplished.

The SJAEs are in operation continuously during normal power operations providing condenser vacuum such that pressure boundary leakage in the SJAE flow path would be apparent. This includes the flow path from the main condenser to the turbine building wall.

When mechanical vacuum pumps are operating, during startup or shutdown, failure of the pressure boundary would affect the ability to maintain a vacuum in the main condenser and

would therefore be detected. When the SJAEs are placed in service during power operations, the mechanical vacuum pumps are isolated, and pressure boundary leakage between the main condenser and the mechanical vacuum pumps' inlet isolation valves would be detected.

The pressure boundary integrity of these components is demonstrated during normal operations and will not change following a control rod drop accident. Assurance that the main condenser can perform its post-accident intended function of holdup and plateout is continuously demonstrated by its ability to support normal plant operation. Therefore, a typical aging management review based on materials and environment is not necessary for the components described in (a) and (c) above.

This approach for aging management review has been previously accepted by the NRC in NUREG-1875, Vol. 2, *Safety Evaluation Report Related to the License Renewal of Oyster Creek Generating Station*, April 2007, Section 3.4.2.3.4 where it states,

> The intended function of the main condenser is to provide a post-accident holdup and plateout volume for MSIV bypass leakage. This intended function is not a pressure boundary function. The approach for aging management of the Main Condenser is to demonstrate adequate post-accident structural integrity of the Main Condenser, based on the fact that the condenser is operating prior to the accident and that the conditions, for the condenser are more severe during power operations than they are post-accident, when the MSIVs will be closed and vacuum will be lost. The structural integrity of the main condenser components during power operation will not immediately change post accident, and no aging effects will cause a loss of intended function in the short time that the main condenser is credited following the accident. Since no aging effects can cause a loss of intended function, no aging management is required. Assurance that the main condenser will be available to perform its post-accident intended function is continuously demonstrated by its ability to support normal plant operation.
>
> On the basis of its review, as discussed above, the staff concludes that the applicant has demonstrated that the aging effects associated with the main condenser components will be adequately managed so that the intended function(s) will be maintained consistent with the CLB for the period of extended operation, as required by 10 CFR 54.21(a)(3).

<u>Additional Components in Scope</u>

Review of the AR and OG system functions determined that additional piping and components in line 1-OG-101-14 (14" AR-2, LRA Drawing 2037 coordinate B-9) from the ERP back to the first OG isolation valve (OG-AO-254, LRA Drawing 2037 coordinate F-8) support the system intended function of providing a barrier to ground level release during accidents when the standby gas treatment (SGT) system must operate, in accordance with 10 CFR 54.4(a)(2).

Components added for this intended function begin at the off-gas filter building wall (LRA Drawing 2037 coordinate E-11) and extend back to OG-AO-254, to the outlet check valves (10CV and 11CV, LRA Drawing 2037 coordinates E/F-10) of the off-gas dilution fans, and back through the sample pump flow path, stopping at the Kaman radiation monitors (LRA Drawing 2037 coordinates A/B-7-9), which brings in pumps OG-P-1A/B and RMP-P-3C (LRA Drawing 2037 coordinates B-10/12), and associated tanks, valves and piping. Because these components are in the radiation monitoring – process (RMP) system, an intended function of providing a barrier to ground level release is added to the description of the RMP system in LRA Section 2.3.3.14.

Component types, material and environments for these components were reviewed and added to the aging management review LRA Table 3.3.2-12, "Plant Drains," and LRA Table 3.3.2-14-19, "Radiation Monitoring-Process system" (see Attachment 4, Changes 9 and 12). In addition, associated changes were required for LRA Tables 2.3.3-12, 2.3.3-14-19, and 3.3.1, and Sections 2.3.3.12, 2.3.3.14, 3.3.2.2.10, and B.1.31 as provided in Attachment 4 (Changes 1, 2, 3, 4, 6, 7, 8, and 14).

NRC Request: *RAI 2.3.3.12 OG-9 Off-gas System*

Background:

10 CFR 54.21(a)(1) requires the applicant to provide a list of structures and components subject to an AMR.

Issue:

In RAI 2.3.3.12 OG-5, dated July 16, 2009, the staff noted in LRA Section 2.3.3.12 for the OG system the applicant includes several piping runs with instrumentation in the off-gas building in scope of license renewal and highlighted orange on LRA Drawing 2037, indicating the piping is in scope in accordance with 10 CFR 54.4(a)(1). Yet the fluid-filled oil system in the OG building that supports the OG system is not shown as in scope of license renewal. The staff requested the applicant justify the exclusion of the oil system components from the scope of license renewal. In its response to RAI 2.3.3.12 OG-5, dated August 17, 2009, the applicant stated that orange highlighted piping to OG-DPT-550 and OG-DPIS-550 was in scope for a functional (a)(2) not (a)(1) as a pressure boundary for the safety-related instruments OG-DPT-114 and OG-DPIS-114. Therefore, the applicant position is that there are no safety-related components in the OG building; hence, the oil system components are not required to be included in scope of license renewal.

The staff disagreed with the applicant's response to RAI 2.3.3.12 OG-5. The staff noted that part of the piping to pressure instruments OG-DPT-550 and OG-DPIS-550 included piping to monitor and equalize the vacuum between the OG 48" hold up line and the Z sump. This function is described in USAR Chapter IX, Section 4.5.1 as having the capability to interfere with

post-accident Z sump operation. The applicant identified these monitoring instruments as safety-related, but did not identify their location, which appears to be in the OG building. Also along with the monitoring as a safety-related function, the equalization line should be safety-related as well. From LRA Drawing 2037, the ¾" equalization line appears to be in the OG building as well. Having these safety-related components in the OG building contradicts the applicant's information provided in the RAI response that there are no safety-related components in the OG building.

Request:

a) *Examine whether there are safety-related components in the OG building, to include the instruments used to monitor the pressure in the sump, and the equalization line from the Z sump to the holdup line for inclusion in scope under 10 CFR 54.4(a)(1), and perform an evaluation of nonsafety-related components for inclusion in scope under 10 CFR 54.4(a)(2).*

b) *Amend the LRA to add the (a)(1) functions for monitoring and equalizing the sump with the hold up line, that were identified in RAI 2.3.3.12 OG-7 or provide adequate justification otherwise.*

NPPD Response:

a) Upon further review, as stated in LRA Section 2.1.2.1.2, the OG building does contain safety-related components. These safety-related valves and associated piping and tubing are part of the OG system monitoring and equalization components that support the operation of the Z sump by equalizing the vacuum between the OG 48" hold-up line and the Z sump. These components are required to support the 10 CFR 54.4(a)(1) function "Support Z sump function to assure SGT system operation" in LRA Section 2.3.3.12, "Plant Drains, Off-Gas System." These safety-related OG system components located in the OG building are highlighted in orange on LRA drawing 2037 (Zone C10-C11) as in scope for 10 CFR 54.4 (a)(1) and subject to aging management review in AMM-11, Plant Drains. Additional review of nonsafety-related passive components located in the OG building identified low-pressure, fluid-filled components in the OG sample pump oil subsystem that are considered in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2). LRA Tables 2.3.3-14-14 and 3.3.2-14-14 have been revised to include the OG sample pump oil subsystem (see Attachment 4, Changes 5 and 10). The remaining nonsafety-related fluid-filled components and components attached to safety-related passive components in the OG building are in scope and subject to aging management review and are included in the LRA tables.

b) As stated in the response to part (a) above, monitoring and equalizing the vacuum between the OG 48" hold-up line and the Z sump is part of the 10 CFR 54.4(a)(1) intended function "Support Z sump function to assure SGT system operation" in LRA

Section 2.3.3.12, Plant Drains, Off-Gas System. Therefore, no change to the LRA is necessary.

NRC Request: *RAI 2.3.3.12 OG-10 Off-gas System*

Background:

10 CFR 54.21(a)(1) requires the applicant to provide a list of structures and components subject to an AMR.

Issue:

In RAI 2.3.3.12 OG-7, dated July 16, 2009, the staff noted in the LRA Section 2.3.3.12 there were functions identified for the OG system under 10 CFR 54.4(a)(1), indicating that the OG system contained safety-related components. The staff requested the applicant identify the safety-related components in the OG system and the safety function they provide. In its response to RAI 2.3.3.12 OG-7, dated August 17, 2009, the applicant identified the safety function that OG system performs is venting the Z sump to the ERP, and monitoring and equalizing the vacuum between the 48" hold-up line and the Z sump. The applicant provided a list of the identification number of the safety-related valves and their location on LRA Drawings 2037 and 2005 sheet 2.

The staff does not agree that the list was comprehensive to include all the safety-related components in the OG system. The applicant supplied a list of the safety-related valves in the OG system from their database. However, the applicant did not provide any piping line numbers. There are several runs of piping that do not have valves; therefore the staff can not positively identify the lines that are safety-related. In addition, there are other valves not on the list provided that appear to be on safety-related lines.

Example: on LRA Drawing 2005 sheet 2 there are two drain lines from the ERP to the Z sump. The list provided by the applicant includes OG-113, hence indicating that line 1 ½" FDR-2 is safety-related; however, the redundant line 1 ½" FDR-2 that is heat-traced contains valve OG-104, which was not included on the list of safety-related valves in the OG system.

Request:

Perform a more in-depth review of the OG system not relying solely on using their component database system and provide a complete list of safety-related components, to include piping, in order for the staff to ensure that the applicant did not omit any components from the scope of license renewal.

NPPD Response:

The OG differential pressure (ΔP) monitoring and equalizing function, described in the response to RAI 2.3.3.12-OG-7, is not required during or following a design basis event (i.e., it is a function that ensures the readiness of the SGT system) and is therefore not a safety function in accordance with 54.4(a)(1). However, some of these ΔP monitoring components have been conservatively classified as safety-related at Cooper Nuclear Station (CNS), and therefore the ΔP monitoring and equalizing function is included for license renewal as having an intended function in accordance with 10 CFR 54.4(a)(1). These components are located in the OG building and yard. All components located in the OG building that are within the scope of license renewal in accordance with 10 CFR 54.4(a)(2) in relation to the OG ΔP monitoring and equalizing function components have been identified and included (see response to RAI 2.3.3.12 OG-9). There are no components in the yard that meet the criterion of 10 CFR 54.4(a)(2) that are not already in scope.

Regarding the vent line to the ERP and the drain lines from the ERP to the Z sump in the "Example" above, there is no additional piping or components that would be in scope for 10 CFR 54.4(a)(2) even if their functions were all conservatively classified as meeting the criteria of 10 CFR 54.4(a)(1).

The OG system has no other safety functions besides these functions associated with the Z sump and the ERP; therefore, no additional evaluations for 10 CFR 54.4(a)(2) are required and all components have been appropriately included in scope and subjected to aging management review.

NRC Request: *RAI 2.3.3.12 PD-4 Plant Drains*

Background:

During the plant walkdown, the staff noted that there was turbine building roof drain piping located in areas of the plant containing system, structure, and components (SSCs) in the scope for license renewal under the applicability of 10 CFR 54.4(a)(1). In addition to the turbine building roof drains, the staff noted there was black drain pipe on the back wall in the emergency battery room, which could not be positively identified as to what system it belonged to and if it was properly identified as in scope for license renewal.

The staff could not identify an LRA section describing the roof drains or LRA drawings that show the flow path of the roof drains except for LRA drawing 2038 SH 1, which shows some reactor building roof drains.

Issue:

10 CFR 54.21 requires each applicant to describe and justify the methods used to identify and list those structures and components subject to an AMR. The staff saw turbine building roof drain piping in an area with 10 CFR 54.4 (a)(1) SSC, but could not find this piping accounted for in the LRA, including the LRA drawings. Furthermore, the drain pipe in the emergency battery room could not be accounted for in the LRA, including the LRA drawings. Additionally the LRA does not mention any roof drains other than on LRA drawing 2038 SH 1. Many buildings contain 10 CFR 54.4 (a)(1) SSC which may have internal roof drain piping. None of this piping is accounted for in the LRA.

Request:

a) Justify the exclusion of above mentioned piping from the scope of license renewal under 10 CFR 54.4(a)(2) and subject to an AMR.

b) Identify all roof drains for every building that contains SSC that are in the scope for license renewal under the applicability of 10 CFR 54.4(a)(1) and show which roof drain piping is and is not in scope for license renewal under the applicability of 10 CFR 54.4(a)(2).

NPPD Response:

a) The roof drain components are assigned to the non-radioactive drain system. Plant walkdowns were used to identify the roof drain components and their locations in buildings containing 10 CFR 54.4(a)(1) SSCs.

All piping and piping components associated with the turbine building roof drains are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2). The components are listed as component types "bolting" and "piping" in LRA Table 2.3.3-14-9, "Floor Drains, Nonradioactive System."

The drain pipe on the back wall in the emergency battery room is a waste water pipe assigned to the potable water system routed from the lavatory facilities located on elevation 932' near the control room in the control building. These components are listed as component types bolting and piping in LRA Table 2.3.3-14-17, "Potable Water System." Since the waste water is not considered treated water, a line item is added to LRA Table 3.3.2-14-17, "Potable Water System [10 CFR 54.4(a)(2)]," along with a conforming change to LRA Section B.1.31, as provided in Attachment 4 (Changes 11 and 14).

b) Roof drain piping and piping components passing through the internal portions of the areas listed below that contain SSCs in scope for 10 CFR 54.4(a)(1) are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2). The components are listed as component types "bolting" and "piping" in LRA Table 2.3.3-14-9, "Floor Drains, Nonradioactive System."

Control Building
Diesel Generator Rooms
Intake Structure service water pump room
OG Building
Reactor Building (excluding the railroad airlock)
Turbine Building (excluding the turbine building basement)

NRC Request: *RAI 2.3.3.12 PD-5 Plant Drains*

Background:

The LRA originally listed the RW system function of providing "a barrier to ground level release via the Z sump during accidents where the SGT system must operate" as an intended function for 10 CFR 54.4(a)(1). In response to RAI 2.3.3.12 OG-6 and RAI 2.3.3.12 PD-3, the applicant revised the above stated function to be an intended function for 10 CFR 54.4(a)(2) by explaining that valves RW-V-10 and RW-V-11 and the remaining portion of the flow path to the radwaste building is nonsafety-related with an intended function in accordance with 10 CFR 54.4(a)(2).

USAR Chapter X, Section 14.2 lists the safety design basis of the equipment and floor drainage systems. This section lists two safety design basis. The first safety design basis is to ensure that the Z sump in flows from condensation does not impede the flow of the SGT system to the ERP. The second safety design basis is to provide a barrier to ground level release via the Z sump during accidents where the SGT system must operate.

Issue:

The portion of the piping described in the Background, that provides a barrier to a ground release, is necessary in performing the second safety design basis described above. Yet the applicant has designated this piping to be in scope for license renewal in accordance with 10 CFR 54.4(a)(2) and not 10 CFR 54.4(a)(1).

Request:

Justify why the portion of the piping described in the Background, which provides a barrier to a ground release, is not designated in scope for license renewal in accordance with 10 CFR 54.4(a)(1), since it performs the second safety design basis described in USAR Chapter X,

Section 14.2. If the piping is in scope for 10 CFR 54.4(a)(1), SSC in the vicinity needs to be evaluated for in scope 10 CFR 54.4(a)(2).

NPPD Response:

A safety design basis as defined in CNS USAR Section I-2.0 is not necessarily a safety function in accordance with 10 CFR 54.4(a)(1). A safety design basis states in functional terms the unique design requirements which establish the limits within which the safety objective shall be met. The design bases support the safety objectives, but in and of themselves, may not meet the criteria of 10 CFR 54.4(a)(1). For example, USAR Section III-9.2 lists seven items under the heading of safety design basis of the standby liquid control (SLC) system, a system that is nonsafety-related. None of these design basis items makes the SLC system in the scope of license renewal per the criteria of 10 CFR 54.4(a)(1). From this it can be seen that in the CNS USAR, the phrase *safety design basis* is not synonymous with a safety function identified in the criteria of 10 CFR 54.4(a)(1).

Piping components from the Z sump up to and including the sump pump discharge check valves are safety-related components relied on to remove water from the Z sump that could potentially block flow through the ERP leading to a ground level release. The specified function performed by the radwaste piping and valves downstream of the check valves does not meet the criteria of 10 CFR 54.4(a)(1) and therefore these components are classified as nonessential. However, they are conservatively included in scope for 10 CFR 54.4(a)(2).

NRC Request: *RAI 2.3.3.10 IA-1 Instrument Air*

Background:

Drawing 2010 SH 1, Flow Diagram Instrument Air Control & Turbine Building, shows fire protection air accumulators FP Sys 5, 14,8,9,10,11,1A&7, 21,15,16,17,18,19, & 20 among others and associated piping. The accumulators and associated supply air piping and valve bodies are not shown as subject to an AMR.

Issue:

10 CFR 54.4 (a)(3) states that all systems, structures and components relied on in safety analyses or plant evaluations to perform a function that demonstrates compliance with the commissions regulations for fire protection (10 CFR 50.48) are within the scope of license renewal.

10 CFR 54.21 states that systems structure and components within the scope of license renewal are subject to an AMR if they perform their intended function without moving parts or without a

change in configuration or properties and are not subject to replacement based on qualified life or specified time period.

Request:

Explain why the above described system, structure and components are not shown as subject to an AMR and listed in the appropriate tables of the LRA.

NPPD Response:

The non-safety related fire protection (FP) accumulators, piping and valve bodies shown on LRA drawing 2010-SH01 supply air to FP deluge and pre-action systems 5, 14, 8, 9, 10, 11, 7, 21, 15, 16, 17, 18, 19, and 20. These components are also shown on LRA drawings 2016-SH01 and 2016 SH01B. For deluge systems, the air supply provides a constant back pressure on the deluge system trip diaphragm to prevent inadvertent actuation. For the pre-action system, the air supply provides pressure between the closed sprinkler heads and the deluge trip diaphragm to monitor system integrity. The air supply is not required for this portion of either of these FP systems to perform their intended functions of supplying water for fire suppression. Upon loss of this air supply, supervisory alarms are received and the trip diaphragm will release, allowing the deluge valve to open and supply water to the FP sprinkler system. Since the air pressure boundaries of the accumulators, piping, and valve bodies are not required for the FP system to perform its intended function, these FP components have no license renewal intended function and are not subject to AMR.

System 1A shown on LRA drawing 2016-SH01 coordinate B-9 is a wet pipe system and does not have air accumulators or associated air supply piping and valves.

NRC Request: *RAI 2.3.3.10 IA-2 Instrument Air*

Background:

Drawing 2022 SH 1, Flow Diagram Primary Containment Cooling and Nitrogen Inerting System, shows a 1/2 inch pipe at location A-6 within the scope of license renewal and subject to an AMR and continuing on drawing 117C3317 SH 2. This drawing is not in the LRA.

Issue:

Since drawing 117C3317 SH 2 is not in the LRA, the staff cannot determine whether the applicant has appropriately considered the continuation of the piping on this drawing to be within the scope of license renewal and subject to an AMR in accordance with 10 CFR 54.21 and 10 CFR 54.4.

Request:

Identify the above listed piping and determine whether the piping is within the scope of license renewal and subject to an AMR. Revise the LRA accordingly.

NPPD Response:

The 1/2 inch piping and associated valves highlighted in yellow on LRA drawing 2022-SH01 coordinate A-6, continuing on drawing 117C3317 Sheet 2, are exposed to an internal nitrogen gas environment. Though not shown on an LRA drawing, the passive mechanical components represented on instrument detail drawing 117C3317, Sheet 2 are rack mounted components supporting instrumentation for the nitrogen gas system. These components are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) and are listed as component types "flow indicator," "tubing," and "valve body" in LRA Table 2.3.2-8-6, "Primary Containment System."

NRC Request: *RAI 2.3.4.2 CF-2 Condensate Filter Demineralizer*

Background:

10 CFR 54.21(a)(1) requires the applicant to provide a list of structures and components subject to an aging management review (AMR).

Issue:

In RAI response 2.3.4.2-CF-1, the applicant indicated that the components corresponding to the condensate filter demineralizer (CFD) system are in scope and subject to AMR include valve body and piping components, and are shown on LRA drawing 2049, sheet 4 (location B/C-5). However, the staff could not identify these components in the provided location.

Request:

Provide clarification of the components that comprise of the CFD system and their spatial interaction with any safety-related systems.

NPPD Response:

As discussed in the response to RAI 2.3.4.2 CF-1, the majority of the condensate filter demineralizer (CF) components are located in the radwaste building, which contains no safety-related components. Section XI-7.3 of the CNS USAR references drawings 2035 SHT01, 02, 03 and 04 for the CF system. These drawings contain no safety-related components and no in-scope

nonsafety-related components. Since the flow diagrams containing these components have no in-scope components, they were not supplied as LRA drawings.

CF system components that are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction are located in the reactor building and are included in LRA Table 3.4.2-2-3, "Condensate Filter Demineralizer System [10 CFR 54.4(a)(2)]." The only CF components shown highlighted on an LRA drawing as subject to aging management review based on the criterion of 10 CFR 54.4(a)(2), are CF valve bodies [1"V353X (20CV)] and [1"V253X(218)] and associated downstream piping (1" CH-3) shown on LRA drawing 2049-SH04 coordinates B/C-5. The piping (1" CH-3) continues from LRA drawing 2049 SH04 at coordinate H-1 to LRA drawing 2049 SH02 at coordinate H-10 where it enters the torus area. The piping (1" CH-3) highlighted as subject to aging management review continues up to the torus/radwaste building wall shown on LRA drawing 2049 SH02 coordinate H-10. The remaining CF components (54 valve bodies and associated bolting, piping, and tubing) that are in scope and subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction are not shown on a flow diagram but on instrumentation detail drawings that were not suitable for LRA drawings.

The remainder of the components shown highlighted on LRA drawing 2049-SH04 are assigned to the condensate makeup (CM) or radwaste (RW) system codes, and as shown are subject to aging management review based on the criterion of 10 CFR 54.4(a)(2) for spatial interaction. These component types are evaluated in LRA Table 3.4.2-2-4, "Condensate Makeup System [10 CFR 54.4(a)(2)]" and LRA Table 3.3.2-14-23, "Radwaste System [10 CFR 54.4(a)(2)."

NRC Request: *RAI 2.3.4.2 CM-3 Condensate Makeup*

Background:

10 CFR 54.21(a)(1) requires the applicant to provide a list of structures and components subject to an aging management review (AMR).

Issue:

In LRA Section 2.3.4.2, the applicant states that the condensate makeup (CM) system has the intended functions for 10 CFR 54.4(a)(1) to provide water to the emergency core cooling systems (ECCS). The applicant states the emergency condensate storage tanks (ECSTs) and CM system components that support the high pressure coolant injection (HPCI) system pressure boundary are reviewed with the HPCI system in LRA Section 2.3.2.4. There were no specific CM components highlighted in a unique color designation to support this (a)(1) function.

The staff noted in the Cooper Nuclear Station USAR Chapter XIV, Section 6.4, the applicant credits the flow path from condensate storage tank (CST) 1A to the core spray (CS) and residual

heat removal (RHR) pumps when the suppression pool is drained in response to U.S. Nuclear Regulatory Commission IE Bulletin No. 84-03, August 24, 1984. The applicant's evaluation concluded that upon a loss of refueling cavity inventory due to a seal failure, the CS and/or the RHR systems would allow the operator ample time to place fuel in a safe location per their emergency operating procedures. CNS Technical Specifications allow refueling operations to be conducted with the suppression pool drained provided an operable CS or low pressure coolant injection subsystem is aligned to take a suction on CST 1A, containing at least 150,000 gallons. However, the applicant does not identify CST 1A, nor the flow path from CST 1A (16" CH-4) as being in scope of license renewal from the CST until the reactor building, and only identifies selected piping (14" CH-4) in scope under 10 CFR 54.4(a)(2).

Request:

Provide justification of the exclusion of any components in the CM system for the scope of license renewal used to provide ECCS with water that are not included with the HPCI system.

NPPD Response:

To clarify, USAR Section XIV-6.4 specifically states, "Loss of refueling cavity inventory due to a seal failure[71] was evaluated that, if refueling cavity seal failed, the Core Spray and/or the Reactor Heat Removal systems would allow ample time to place fuel in a safe location per CNS Emergency Operating Procedures." Footnote 71 is IE Bulletin (IEB) No. 84-03, Refueling Cavity Water Seal, dated August 24, 1984. The response to the IEB, dated September 20, 1984, stated that either the suppression pool or the condensate storage tank would provide a water source in the unlikely event of a reactor well bellows seal failure. The design of the bellows seal at CNS is such that only minor leakage would occur, not a gross seal failure.

Technical Specification (TS) 3.5.2 (discussed in the Issue section) is for ECCS—Shutdown conditions and applies in Modes 4 and 5, unless the spent fuel storage pool gates are removed and the water level is greater than 21 feet over the top or the reactor pressure vessel flange.

As stated in the response to IEB 84-03, if there were a failure of the reactor well bellows seal, fuel would be uncovered only if it were in transit at the time of the bellows failure. Fuel is only in transit when the spent fuel storage pool gates are removed, i.e., when TS 3.5.2 does not apply and CST 1A is not credited. When the spent fuel storage gates are in place and TS 3.5.2 applies, fuel would not be in transit and a failure of the reactor well bellows seal would not result in uncovering fuel.

Use of CST 1A as a source for an ECCS pump is not credited in any design basis accident analysis. Rather, it is an allowance for an unusual configuration occurring when the torus is unavailable as an ECCS pump water source due to maintenance. As stated in USAR Section XIV-6.4, the only fuel handling accident that could result in the release of significant quantities

of fission products directly to the secondary containment is dropping a fuel bundle onto the top of the core. Therefore, CST 1A and the piping from it to an ECCS pump do not meet the criteria of 10 CFR 54.4(a)(1), (2), or (3).

Attachment 2

Response to Request for Additional Information
for License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

The Nuclear Regulatory Commission (NRC) Request for Additional Information (RAI) regarding the License Renewal Application (LRA) is shown in italics. The Nebraska Public Power District's (NPPD) response to this RAI is shown in block font.

NRC Request: *RAI 3.3.2.2.6-3 Neutron Absorber Monitoring Program for Boral*

1. *In the license renewal application, it was stated that the Water Chemistry Control – BWR Program and Neutron Absorber Monitoring Program will continue to monitor the material degradation and neutron attenuation performance of Boral in the spent fuel pool during the period of extended operation. Please discuss the frequency at which the surveillance inspections will be conducted.*

2. *On page 40 of your July 29, 2009 (Agencywide Documents Access Management System (ADAMS) Accession No. ML092160084) letter, it was stated that evaluation for change in material properties such as Boron-10 areal density measurement is not done due to operating experience obtained from previous neutron attenuation testing performed. Please discuss the results of the last evaluation for Boron-10 areal density measurement. In addition, please discuss whether any future neutron attenuation testing will be performed.*

3. *On pages 41 - 43 of your July 29, 2009 letter, it was stated that three Boral coupons were identified as being swollen in the 1982 and 1992 surveillance inspections. Subsequently, testing was performed on the coupons and it was reported that the swelling was due to internal mechanical failure combined with water being entrained in the coupons, and small leakage into the coupons.*

    a. *It was reported that three of the twenty-one coupons in the spent fuel pool were identified with swelling and underwent testing. Please discuss whether the remaining 18 coupons were examined for swelling and discuss their results.*
    b. *Please discuss why the coupons identified with swelling are not characteristic of swollen Boral panels in the spent fuel pool racks.*
    c. *Please discuss the extent of swelling identified in the coupons and whether any swelling has been identified in the Boral panels in the spent fuel pool racks. Additionally, please provide the trending results for the swollen coupons that were returned back to the spent fuel pool after inspection and testing.*
    d. *Please discuss how the neutron attenuation tests on the swollen coupons were performed, i.e. were the coupons submerged in water before testing for neutron*

attenuation. Further, please discuss whether the swollen coupons exhibited any reduction in neutron attenuation performance.

e. Please discuss whether swelling of coupons with gas is bounded by the criticality analysis.

4. Please discuss the applicability of using NUREG-1787, "Safety Evaluation Report Related to the License Renewal of the Virgil C. Summer Nuclear Station," March 2004, and BNL-NUREG-25582, "Corrosion Considerations in the Use of Boral in Spent Fuel Storage Pool Racks," January 1979, as justification of aging effects of Boral being insignificant at CNS.

NPPD Response:

1. As stated in Section 1.d of the response to RAI 3.3.2.2.6-1, each surveillance inspection occurs once every eight years. Monitoring of water chemistry parameters is conducted in accordance with Electric Power Research Institute (EPRI) water chemistry guidelines published in EPRI Report 1008192 (BWRVIP-130).

2. As stated in Section 1.j of the response to RAI 3.3.2.2.6-1, evaluation results of Boral coupons in 1982 showed that neutron shielding performance exceeded the minimum requirements for a new Boral panel, and evaluation in 1992 showed no loss of neutron absorber material and no indication of non-uniform distribution of the Boron-10 in the absorber material. These results indicated no loss in neutron absorption capability. As stated in Section 1.g.iii of the response to RAI 3.3.2.2.6-1, Boron-10 areal density measurement is no longer performed. However, as stated in Section 3.a and b of the response to RAI 3.3.2.2.6-1, a condition that potentially leads to a reduction in neutron absorbing capacity due to degradation of material (e.g., corrosion, blistering, swelling) would first yield physical manifestations that would be detected through the Neutron Absorber Monitoring Program. Appropriate corrective actions would be taken based on the physical manifestations observed. Typical corrective actions for unacceptable coupon inspection results include coupon evaluation by outside experts, rack inspection, and rack "blackness" testing which would detect any loss of neutron absorption capability.

3a. As stated in Section 1.d of the response to RAI 3.3.2.2.6-1, all Cooper Nuclear Station (CNS) Boral coupons were weighed, visually inspected, and photographed, and thickness measurements were taken at three points along the length of the coupons. Visual inspections checked for loss of material, swelling, and blistering.

As stated in Section 1.j of the response to RAI 3.3.2.2.6-1, two of twenty Boral coupons were found swollen in the 1982 inspection; the other eighteen were not swollen. One of these coupons was destructively examined; therefore, it was not returned to service. One

of nineteen Boral coupons was found swollen in the 1992 inspection; the other eighteen were not swollen.

3b. As stated in Section 1.j of the response to RAI 3.3.2.2.6-1, the 1982 evaluation determined that the main constituent of the entrapped gas was hydrogen, with an internal gage pressure of less than 3 psi. An internal gage pressure of 50 psi was applied to the sample without causing swelling. Therefore, the conclusion was that the swelling was due to internal mechanical failure of the coupon combined with water entrained in the failed coupon at the time of the final factory leak test prior to shipment. The mechanical failure was ascribed to the shearing required to reduce the samples to a smaller than original size prior to shipment. The swelling did not indicate a condition which would affect the panels themselves, as they did not undergo the same shearing process.

As stated in Section 1.j of the response to RAI 3.3.2.2.6-1, the 1992 evaluation found that the swollen coupon showed swelling typical of a sealed Boral sample when water leaks into the enclosed space. The bulges observed on the coupon were considered unique to the coupon and not representative of the Boral panels in the racks. The conclusion was that the swelling noted was due to a small leak in the coupon.

3c. A total of three swollen coupons were identified.

Minor swelling was noted in two of twenty Boral coupons in the 1982 inspection. One of these coupons was destructively examined as discussed in Section 1.j of the response to RAI 3.3.2.2.6-1. Therefore, it was not returned to service and no data has been trended.

Minor swelling was noted in one of nineteen Boral coupons in the 1992 inspection. This coupon was returned to service. The coupon that had been noted as swollen in the 1982 inspection displayed a slight reduction in swelling in this 1992 inspection.

Each Boral coupon was measured at three standard locations. Of these standard locations, the top was the location where the swelling was noted in the 1982 and 1992 observations. Thickness measurements at the top location of the swollen coupons and coupon weights are reported below, from the initial installation of the Boral coupons in 1979 through the most recent measurements in June 2002.

Sample 363-A-2-1: documented as swollen during 1982 inspection
Sample 196-A-4-2: documented as swollen during 1992 inspection

Coupon Thickness at Top Location (inches)		
	Coupon Number	
Data Date	**363-A-2-1**	**196-A-4-2**
Initial	0.1869	0.1807
February 1982	0.3502	0.1732
March 1983	0.222-0.263	0.196
June 1984	0.253	0.389
May 1986	0.2683	0.3993
July 1989	0.307	0.402
March 1992	0.285	0.385
January 1997	0.275	0.387
June 2002	0.269	0.392

Coupon Weight (grams)		
	Coupon Number	
Data Date	**363-A-2-1**	**196-A-4-2**
Initial	315.51	310.1
February 1982	317.17	311.51
March 1983	317.18	313.97
June 1984	318.81	314.23
May 1986	318.31	313.6
July 1989	316.51	310.57
March 1992	318.32	313.79
January 1997	318.11	313.64
June 2002	318.3	313.9

The data shows a thickness change at the top location as swelling occurred. Measurements at that location remain consistently higher. This is consistent with the conclusion that the swelling was due to internal mechanical failure of the coupon combined with water entrained in the failed coupon at the time of the final factory leak test prior to shipment, as discussed in Section 1.j of the response to RAI 3.3.2.2.6-1. The mechanical failure was ascribed to the shearing required to reduce the samples to a smaller than original size prior to shipment. The swelling did not indicate a condition which would affect the panels themselves as they did not undergo the same shearing process.

This data also shows a slight weight gain in the swelled coupons which is consistent with minor water intrusion.

Results of the 2002 inspection showed no significant degradation of any coupon. No swelling, binding, or other abnormalities have been identified in the Boral panels in the

spent fuel racks. These racks are routinely examined prior to fuel movement in the spent fuel pool.

3d. As stated in Sections 1.g.i and 1.g.ii of the response to RAI 3.3.2.2.6-1, Boral coupons are mounted inside the spent fuel pool and are open to the spent fuel pool water, except for the two control coupons which are mounted outside the spent fuel pool. Thus, the swollen coupons had been submerged in water prior to testing. As stated in Section 1.j of the response to RAI 3.3.2.2.6-1, the swollen coupons exhibited no reduction in neutron absorption performance.

3e. As stated in Section 1.j of the response to RAI 3.3.2.2.6-1 and above in 3.b, swelling of the coupons is not considered representative of the racks condition. Neutron attenuation testing and radiography of the swollen coupons showed no loss of neutron absorber material and no indications of change in the areal density. Therefore, swelling of the coupons had no impact on the criticality analysis for the racks discussed in CNS USAR Section X-3.6.

4. NPPD has not asserted that the aging effects of Boral are insignificant, as shown by the identification of loss of material as an aging effect requiring management in the LRA. The question posed in Section 3.c of RAI 3.3.2.2.6-1 pertained only to reduction of neutron absorbing capacity due to sustained irradiation of Boral.

As documented in Section 3.5.2.4.2 of the license renewal Safety Evaluation Report (SER) for VC Summer (NUREG-1787), the NRC staff accepted the position that Boral does not degrade as a result of long-term exposure to radiation. The potential aging effects resulting from sustained irradiation of Boral were evaluated by the staff (in BNL-NUREG-25582, dated January 1979) and determined to be insignificant. The inspection findings at CNS and other facilities are not inconsistent with the staff's evaluation of the effects of sustained irradiation of Boral on neutron absorption capacity. Degradation observed in recent industry operating experience for Boral does not include reduction of neutron absorption capacity and has not been attributed to irradiation of Boral.

NRC Request: *RAI 3.3.2.2.6-4 Water Chemistry Control – BWR Program, Metamic Coupon Sampling Program, and Periodic Testing of Metamic*

1. Please confirm that the Water Chemistry Control – BWR Program and Metamic Coupon Sampling program will continue to be used to monitor the material degradation and neutron attenuation performance of Metamic in the spent fuel pool during the period of extended operation. In addition, please confirm that the Metamic coupons will continue to be periodically tested in accordance with CNS License Amendment No. 227 (ADAMS Accession No. ML072130023) during the period of extended operation.

2. *Additionally, please discuss how NUREG-1787 and BNL-NUREG-25582 correlate to the performance of Metamic.*

NPPD Response:

1. As revised in response to RAI 3.3.2.2.6-2[1], LRA Table 3.3.2-9, "Fuel Pool Cooling and Cleanup System," indicates that the aging effect of loss of material for aluminum / boron carbide (Metamic™) spent fuel panels in a treated water environment will be managed by the Water Chemistry Control - BWR Program. Reduction of neutron absorption capability is not an aging effect requiring management for the Metamic™ panels at CNS. Nevertheless, NPPD will continue the Metamic™ coupon sampling program to periodically test Metamic™ coupons in accordance with License Amendment 227 during the period of extended operation.

2. As stated in Section 1.b of the response to RAI 3.3.2.2.6-2, the NRC staff has accepted the position that Boral spent fuel panels do not degrade as a result of long-term exposure to radiation (documented in Section 3.5.2.4.2 of the license renewal SER for VC Summer [NUREG-1787]). The potential aging effects resulting from sustained irradiation of Boral were evaluated by the staff (in BNL-NUREG-25582, dated January 1979) and determined to be insignificant. Metamic™ is a fully dense metal matrix composite material composed primarily of boron carbide and aluminum alloy. Boron carbide is the constituent in the Metamic™ known to perform effectively as a neutron absorber and the aluminum alloy is a marine-qualified alloy known for its resistance to corrosion. Boral is also composed of boron carbide and aluminum alloy. The material composition and physical properties of Metamic™ are an improvement on the Boral design that provides reduced neutron streaming. This improvement is based in part on the more homogeneous mixture of aluminum and boron carbide powders in Metamic™ made possible by a smaller boron carbide particle size. As the basic composition of Boral and Metamic™ are the same, with the exception of minor improvements to the mixture of the aluminum and boron carbide, the effects of sustained irradiation on the neutron absorption capability of Metamic™ should be the same as those for Boral. Therefore, the conclusions previously reached by the NRC staff for Boral in the above documents are applicable to the Metamic™ panels at CNS.

[1] NLS2009061, Stewart B. Minahan to USNRC, "Response to Request for Additional Information for the Review of the Cooper Nuclear Station License Renewal Application," August 13, 2009 (ADAMS Accession Number ML09200412).

Attachment 3

Response to Miscellaneous Topics Regarding
the License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

Dialogue has occurred with the Nuclear Regulatory Commission (NRC) staff based on previous responses to Requests for Additional Information (RAI). As documented in the summary of the telephone conference call conducted on October 5, 2009, the Nebraska Public Power District (NPPD) agreed to provide supplemental information to the response to RAI 3.6-1. The NRC supplemental RAI is shown in italics. The NPPD supplemental response to this RAI is shown in block font.

NRC Supplemental Request: *RAI 3.6-1*

In response to the staff RAI 3.6-1, the applicant stated that the 2003 event was due to the fact that the pole structure was not properly grounded, thus allowing stray voltages to build up on the high voltage insulator cold end resulting in enough heat to ignite the wooden pole cross arm. By properly grounding the cold end, the voltage potential that could be caused by corona from a similar event would be harmlessly drained to ground. The incident was event driven as a design deficiency, not an aging issue. The applicant concluded that the surface contamination of farm dust on high-voltage insulators is not an aging effect requiring management for the period of extended operation.

The staff has reviewed the applicant's response and has questions about the applicant's conclusion that the incident was event driven as a design deficiency not an aging issue. Surface contamination buildup on the 345 kV high-voltage insulators caused by high humidity coupled with airborne corn/soybean particle during harvest, allowed a charge to build up on the cold end of the high-voltage insulator string due to corona. The combination of these conditions was contributed to the fire events. High humidity coupled with airborne corn/soybean particle during harvest could enable the conductor voltage to track along insulator surface more easily and can lead to insulator flashover. The buildup of surface contamination is gradual and in most areas such contamination is washed away by rain. However, a large buildup of contamination could enable the conductor voltage to track along the surface more easily. Surface contamination can be a problem in areas where there is greater concentration of airborne particles such as near the corn/soybean fields. Dust collection on high-voltage insulators and cross arms in the presence of light rain or moisture can form a film on the insulators and create a conductive path allowing electricity to flow. A small amount of electricity can leak through this path and reach the wooden cross-arm causing it to burn. Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants Section 3.6.3.2.2 recommends a plant specific aging management program (AMP) for managing degradation of insulator quality due to presence of any surface contamination for plants located

such that the potential exist for surface contaminations. The staff finds that degradation of insulator quality due to the presence of dust buildup near the corn/soybean farms is an applicable aging effect requiring management.

The staff requests the applicant to provide an applicable AMP as appropriate, or justify why surface contamination to high-voltage insulator is not an applicable aging effect requiring an aging management program at Cooper Nuclear Station (CNS).

<u>The applicant provided the following clarifications</u>:

The staff stated: "High humidity coupled with airborne corn/soybean particle during harvest could enable the conductor voltage to track along insulator surface more easily and can lead to insulator flashover." The event at CNS was not a flashover event. The airborne contaminants did not create a flashover event, but did contribute combustible material. Due to inadequate grounding of the insulator, the normal leakage current from the corona created a hotspot at the cold end of the insulator. The corn/soybean dust particles contributed to combustion near the hotspot. The design corrected the inadequate grounding, so the normal leakage current from the corona will no longer create a hotspot at the cold end of the insulator. Without a heat source, the dust from harvesting will not combust.

This is different from high-voltage insulator flashover at coastal plants associated with salt spray. The salt spray forms a film on the insulators and creates a conductive path allowing electricity to flow from the conductor over the surface of the insulator. This current is distinct from the normal leakage current from the corona. The salt spray contamination event causes flashover, not just heating at the cold end of the insulator. The dust event at CNS did not create a flashover or arcing event because a conductive path allowing electricity to flow was not created. Therefore, there is no aging effect requiring management.

In addition, this event on the 345 kV towers, which are not in scope of license renewal, is not applicable to the 161kV and 69kV towers and high voltage insulators that are in the scope of license renewal for CNS.

<u>Followup</u>:

The staff requested that the applicant docket a revision/supplement to the RAI response that captures the above information as well as discussion of the corona effect, normal inspection or maintenance conducted on the 161kV towers, and the frequency of farming activities that create the harvesting dust. The applicant agreed to provide a supplement to the response to RAI 3.6-1.

NPPD Supplemental Response:

The event at CNS was not a flashover event[2]. The airborne contaminants did not create a flashover event, but did contribute combustible material. Due to inadequate grounding of the insulator, the normal leakage current from the corona allowed voltage to increase at the cold end of the insulator[3]. Current from the cold end of the insulator flowed to ground through the cross-arm creating a hot spot that ignited the corn/soybean dust particles. The design corrected the inadequate grounding, so the normal leakage current from the corona will flow harmlessly from the cold end of the insulator to ground. Without a heat source, the dust from harvesting will not combust.

This is different from high-voltage insulator flashover at coastal plants associated with salt spray. The salt spray forms a film on the insulators and creates a conductive path allowing electricity to flow from the conductor over the surface of the insulator. This current is distinct from the normal leakage current from the corona. The salt spray contamination event causes flashover, not just heating at the cold end of the insulator. The dust event at CNS was not a flashover or arcing event because it did not create a conductive path allowing electricity to flow along the surface of the insulator. There is no aging effect requiring management.

In addition, this event on the 345 kV towers, which are not in scope of license renewal, is not applicable to the 161 kV and 69 kV towers and high voltage insulators that are in the scope of license renewal for CNS.

Harvesting operations typically occur once per year in nearby fields, however this frequency is inconsequential as precipitation removes harvest dust from the insulators. The dust from harvests is not excessive and there is no operating experience at CNS or in the industry that suggests that this environment will contaminate high-voltage insulators and lead to flashover or arcing.

This operating experience does not indicate the need for an aging management program for high voltage insulators. However, routine maintenance performed at least annually, including thermography of the 161 kV and 69 kV switchyards, provides additional assurance that contamination of high voltage insulators is not an aging mechanism requiring management at CNS.

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[2] Flashover voltage is the voltage which causes the air around or along the surface of the insulator to break down and conduct, causing a 'flashover' arc along the outside of the insulator. They are usually designed to withstand this without damage.

[3] A corona is a process by which a current develops from an electrode with a high potential in a neutral fluid, usually air, by ionizing that fluid so as to create a plasma around the electrode. Corona discharge is generated when the electric field at the surface of the conductor becomes larger than the breakdown strength of the air. Corona occurs regardless of the extent of surface contamination of the high voltage insulators, since this is a function of the air around the high voltage insulator.

Attachment 4

Changes to the License Renewal Application
Cooper Nuclear Station, Docket No. 50-298, DPR-46

This attachment provides changes to the License Renewal Application (LRA) resulting from the responses to the RAIs of Attachments 1 and 2, and as agreed to in the October 5, 2009 conference call between Nebraska Public Power District and the Nuclear Regulatory Commission staff.[4] The changes are presented in underline/strikeout format.[5]

1. LRA Section 2.3.3.12, "Plant Drains," describing the air removal system, as revised in NLS2009063[6], Attachment 2, LRA Change 3 is revised to read:

   "Noncondensible gases and entrained vapor from the after-condenser are exhausted to the off-gas system. Air ejector exhaust is metered, sampled, and monitored prior to entering the off-gas holdup piping. Discharge from the mechanical vacuum pumps is routed to the off-gas system (the gland seal holdup subsystem), since average gaseous activity is low during startup and shutdown. The control rod drop accident (CRDA) analysis assumes that the mechanical vacuum pumps and steam jet air ejectors ~~trip and~~ are isolated on high radiation. ~~This prevents the vacuum pumps from drawing noncondensibles from the main condenser. Because they are active, the isolation valves are not subject to aging management review.~~ Components between the main condenser and the isolation valves provide an extension of the main condenser boundary. (A valve in the OG system isolates the SJAEs on high radiation. This function is discussed in the OG system description). Components from the mechanical vacuum pumps' outlet isolation valves to the ERP and from the OG isolation valve (OG-AO-254) to the ERP provide a barrier to a ground level release during accidents when the SGT must operate.

   The AR system supports operation of the Z sump. Two safety-related valves are part of the flow path that monitors and equalizes the differential pressure (Δp) that could occur

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[4] The conference call summary (ML092870693) stated that an LRA change related to RAI B.1.13-1was needed. From subsequent discussions with the NRC Staff, it was agreed that an LRA change was not needed, but rather that a clarification to the AMP B.1.13 basis document should be made regarding conformance to the GALL Acceptance Criteria element. This change has been implemented.

[5] The changes shown are made against the original LRA submitted on September 24, 2008, unless otherwise noted. Where other previously made LRA changes affect the same text, a footnote is provided cross-referencing the letter where the previous change was made.

[6] NLS2009063, Brian J. O'Grady to USNRC, "Response to Request for Additional Information for License Renewal Application," August 17, 2009 (ADAMS Accession Number ML092310146), RAIs 2.3.3.12.AR-1, 2.3.3.12.AR-2, and 2.3.3.12.OG-6.

between the off-gas hold-up line and the Z sump. AR system components restrict the flow from the off-gas liquid drain line to within the capacity of one Z sump pump.[7]

The AR system has the following intended functions for 10 CFR 54.4(a)(1).

- Support Z sump function to assure SGT system operation.

The AR system has the following intended function for 10 CFR 54.4(a)(2).

- Isolate the mechanical vacuum pumps on a high radiation signal.
- Provide a barrier to a ground level release during accidents when the SGT must operate.

The AR system has no intended functions for 10 CFR 54.4(a)(3)."

Reference: Response to RAI 2.3.3.12 AR-4.

2. LRA Section 2.3.3.12 describing the off-gas system, as revised in NLS2009063 (RAIs 2.3.3.12.AR-3 and 2.3.3.12.OG-6), Attachment 2, LRA Change 4 is revised to read:

"The purpose of the OG system is to collect and process gaseous radioactive effluents to minimize their release to the atmosphere. The OG system receives gaseous radwaste from the main condenser steam jet air ejectors (~~S~~GJAEs), the mechanical vacuum pumps, the gland steam condensers, and other minor sources. The OG system includes the air ejector off-gas subsystem and the gland seal off-gas subsystem.

The control rod drop accident analysis assumes that the SJAEs are isolated on high radiation. This prevents the SJAEs from drawing noncondensibles from the main condenser for discharge through the elevated release point, which supports the analysis assumption that the only leakage path for dose consequences is from the main condenser into the turbine building and then to the environment. Components from the OG isolation valve to the ERP provide a barrier to a ground level release during accidents when the SGT system must operate.

The OG system includes components that support operation of the Z sump system. Components that vent the Z sump to the ERP are safety-related because this vent line supports secondary containment during post-accident conditions. Other safety-related components monitor and equalize the vacuum between the OG hold-up line and the Z sump.

[7] NLS2009063 – Response to RAI 2.3.3.12.AR-1.

The OG system has the following intended functions for 10 CFR 54.4(a)(1).

- Support Z sump function to assure SGT system operation.
- Maintain secondary containment integrity.

The OG system has the following intended function for 10 CFR 54.4(a)(2).

- Maintain integrity of nonsafety-related components such that no physical interaction with safety-related components could prevent satisfactory accomplishment of a safety function.
- Isolate the SJAEs on a high radiation signal.
- Provide a barrier to a ground level release during accidents when the SGT system must operate.

The OG system has no intended functions for 10 CFR 54.4(a)(3)."

Reference: Response to RAI 2.3.3.12 AR-4.

3. LRA Section 2.3.3.14, "Radiation Monitoring – Process," (Page 2.3-108) is revised to read,

"The purpose of the radiation monitoring—process (RMP) system is to monitor radiation levels in various process streams, including the following:

- air ejector off-gas,
- process liquid, and
- elevated release point.

Radiation monitoring for ventilation systems is performed by the radiation monitoring—vent system.

The safety-related monitoring functions performed by the RMP system are performed by EIC components; there are no safety-related mechanical components in the RMP system.

A sample line in the RMP system is attached to the elevated release point and provides a barrier to a ground level release during accidents when the SGT must operate.

The RMP system also has the following intended function for 10 CFR 54.4(a)(2).

- Provide a barrier to a ground level release during accidents when the SGT must operate.

The RMP system has no intended functions for 10 CFR 54.4(a)(3)."

Reference: Response to RAI 2.3.3.12 AR-4.

4. LRA Table 2.3.3-12, "Plant Drains," (Page 2.3-129) is revised to read[8]:

Component Type	Intended Function
Bolting	Pressure boundary
Flow indicator	Pressure boundary
Hose	Pressure boundary
Piping	Pressure boundary
Pump casing	Pressure boundary
Restriction orifice	Pressure boundary
Tubing	Pressure boundary
Valve Body	Pressure boundary

Reference: Response to RAI 2.3.3.12 AR-4.

5. LRA Table 2.3.3-14-14, "Off Gas System, Nonsafety-Related Components Affecting Safety-Related Systems Summary of Aging Management Evaluation," (Page 2.3-144) is revised to read:

Component Type	Intended Function[1]
Bolting	Pressure boundary
Filter housing	Pressure boundary
Lubricator	Pressure boundary
Piping	Pressure boundary
Sight glass	Pressure boundary
Tank	Pressure boundary
Tubing	Pressure boundary
Valve body	Pressure boundary

[8] Table 2.3.3-12 was previously changed in NLS2009063 (ADAMS Accession Number ML092310146) in response to RAI 2.3.3.12-AR-3.

Reference: Response to RAI 2.3.3.12 OG-9.

6. LRA Table 2.3.3-14-19, "Radiation Monitoring-Process System Nonsafety-Related Components Affecting Safety-Related systems Components Subject to Aging Management Review," (Page 2.3-149) is revised to read:

Component Type	**Intended Function**[1]
Bolting	Pressure boundary
Flow indicator	Pressure boundary
Piping	Pressure boundary
Pump casing	Pressure boundary
Tank	Pressure boundary
Tubing	Pressure boundary

1. For component types included under 10 CFR 54.4(a)(2), the intended function of pressure boundary includes providing structural/seismic support for components that are included for nonsafety-related SSCs directly connected to safety-related SSCs.

Reference: Response to RAI 2.3.3.12 AR-4.

7. LRA Section 3.3.2.2.10, "Loss of Material Due to Pitting and Crevice Corrosion," Item 5 (Page 3.3-23) is changed as follows:

"~~There are no aluminum components exposed to condensation in the HV systems at CNS~~. Loss of material due to pitting and crevice corrosion for stainless steel and aluminum components exposed to condensation is an aging effect requiring management for HV and other systems at CNS. The Bolting Integrity and External Surfaces Monitoring Programs will manage loss of material in stainless steel components exposed to condensation. The Periodic Surveillance and Preventive Maintenance Program manages loss of material from aluminum components exposed to condensation. These programs include periodic visual inspections to manage loss of material of the components."

Reference: Response to 2.3.3.12 AR-4.

8. LRA Table 3.3.1, "Auxiliary Systems, NUREG-1801 Vol. 1," (Page 3.3-35) is revised to read:

3.3.1-27	Stainless steel HVAC ducting and aluminum HVAC piping, piping components and piping elements exposed to condensation	Loss of material due to pitting and crevice corrosion	A plant-specific aging management program is to be evaluated.	Yes, plant specific	The Bolting Integrity and External Surfaces Monitoring Programs manage loss of material in stainless steel components exposed to condensation. The Periodic Surveillance and Preventive Maintenance Program manages loss of material in aluminum components exposed to condensation. ~~There are no aluminum components exposed to condensation in the auxiliary systems.~~ See Section 3.3.2.2.10 item 5.

Reference: Response to RAI 2.3.3.12 AR-4.

9. LRA Table 3.3.2-12, "Plant Drains," is revised to include the following line items:

Filter housing	Pressure boundary	Aluminum	Condensation (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.F1-14 (AP-74)	3.3.1-27	E
Filter housing	Pressure boundary	Aluminum	Air-indoor (ext)	None	None	V.F-2.(EP-3)	3.2.1-50	C
Filter housing	Pressure boundary	Glass	Air-indoor (ext)	None	None	VII.J-8.(AP-14)	3.3.1-93	A
Filter housing	Pressure boundary	Glass	Condensation (int)	None	None	--	--	G
Filter housing	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.D-4 (AP-81)	3.3.1-54	E
Filter housing	Pressure boundary	Stainless steel	Air-indoor (ext)	None	None	VII.J-15 (AP-17)	3.3.1-94	A

Flow indicator	Pressure boundary	Stainless steel	Air-indoor (ext)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Flow indicator	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.D-4 (AP-81)	3.3.1-54	E
Flow indicator	Pressure boundary	Glass	Air-indoor (ext)	None	None	VII.J-8 (AP-14)	3.3.1-93	A
Flow indicator	Pressure boundary	Glass	Condensation (int)	None	None	--	--	G
Pump casing	Pressure boundary	Carbon Steel	Air-indoor (ext)	Loss of material	External Surfaces Monitoring	VII.I-8 (A-77)	3.3.1-58	A
Pump casing	Pressure boundary	Carbon Steel	Condensation (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.H2-21 (A-23)	3.3.1-71	E

Reference: Response to RAI 2.3.3.12 AR-4.

10. LRA Table 3.3.2-14-14, "Off Gas System, [10 CFR 54.4(a)(2)]," is revised to include the following line items:

Filter housing	Pressure boundary	Carbon steel	lube oil (int)	Loss of material	Oil analysis	VII.C1-17 (AP-30)	3.3.1-14	C, 302
Lubricator	Pressure boundary	Carbon steel	lube oil (int)	Loss of material	Oil analysis	VII.C1-17 (AP-30)	3.3.1-14	C, 302
Lubricator	Pressure boundary	Glass	lube oil (int)	None	Oil analysis	VII.J-10 (AP-15)	3.3.1-93	A
Piping	Pressure boundary	Carbon steel	lube oil (int)	Loss of material	Oil analysis	VII.C1-17 (AP-30)	3.3.1-14	C, 302
Tubing	Pressure boundary	Copper alloy	lube oil (int)	Loss of material	Oil analysis	VII.C1-8 (AP-47)	3.3.1-26	C, 302

Valve body	Pressure boundary	Carbon steel	lube oil (int)	Loss of material	Oil analysis	VII.C1-17 (AP-30)	3.3.1-14	C, 302
Valve body	Pressure boundary	Copper Alloy	lube oil (int)	Loss of material	Oil analysis	VII.C1-8 (AP-47)	3.3.1-26	C, 302
Valve body	Pressure boundary	Stainless Steel	lube oil (int)	Loss of material	Oil analysis	VII.C1-14 (AP-59)	3.3.1-33	C, 302

Reference: Response to RAI 2.3.3.12 OG-9.

11. LRA Table 3.3.2-14-17, "Potable Water System [10 CFR 54.4(a)(2)]," is revised to include the following line item:

Piping	Pressure boundary	Carbon steel	Raw water (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.C1-19 (A-38)	3.3.1-76	E

Reference: Response to RAI 2.3.3.12 PD-4.

12. LRA Table 3.3.2-14-19, "Radiation Monitoring-Process System Nonsafety-Related Components Affecting Safety-Related Systems Summary of Aging Management Evaluation," is revised to include the following line items:

Tank	Pressure boundary	Stainless steel	Air-indoor (ext)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Tank	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.D-4 (AP-81)	3.3.1-54	E
Tubing	Pressure boundary	Stainless steel	Air – indoor (ext)	None	None	VII.J-15 (AP-17)	3.3.1-94	A
Tubing	Pressure boundary	Stainless steel	Condensation (int)	Loss of material	Periodic Surveillance and Preventive Maintenance	VII.D-4 (AP-81)	3.3.1-54	E

Reference: Response to RAI 2.3.3.12 AR-4.

13. LRA Section A.1.22 (third paragraph, Page A-12) is revised to read[9]:

This program will be implemented prior to the period of extended operation. This new program will be implemented consistent with the corresponding program described in NUREG-1801, Section XI.E4, Metal-Enclosed Bus, prior to the period of extended operation. Inspection of a sample of accessible bolted connections, MEB internal surfaces, bus insulation, and internal bus supports will be completed prior to the period of extended operation, and at least once every 10 years thereafter. If the inspection of a sample of accessible bolted connections uses visual methods only, this inspection will be completed prior to the period of extended operation, and at least once every 5 years thereafter.

Reference: Clarification requested by the NRC Staff in a conference call conducted on October 5, 2009.

14. LRA Appendix B, Section B.1.31, "Periodic Surveillance and Preventive Maintenance," (Pages B-92 and B-93) is revised to read:

Nonsafety-related systems affecting safety-related systems[10]	Visually inspect the internal surfaces of a representative sample of carbon steel, copper alloy, and gray cast iron piping, piping elements, and components in the circulating water system exposed to raw water (river water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel, copper alloy and gray cast iron piping, piping elements, and components in the nonradioactive floor drain system exposed to raw water (drain water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel piping, piping elements, and components in the heating and ventilation (HV) system exposed to raw water (drain water) to manage loss of material.

[9] Section A.1.1.22 on Page A-12 was previously changed in NLS2009055 (ADAMS Accession Number ML092160083) in response to RAI B.1.22-3.

[10] The Nonsafety-related systems affecting safety-related systems program activity on Pages B-91 and B-92 was previously changed in NLS2009055 (ADAMS Accession Number ML092160083) in response to RAIs 3.2.2.1-2 and 3.3.2-4.

	Visually inspect the internal surfaces of a representative sample of carbon steel, aluminum, copper and stainless steel piping, piping elements, and components in the off gas (OG) system exposed to condensation and raw water (drain water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel, copper and stainless steel piping, piping elements, and components in the radiation monitoring – process (RMP) system exposed to condensation to manage loss of material. Visually inspect the internal surfaces of a representative sample of copper alloy piping, piping elements, and components in the potable water (PW) system exposed to treated water (potable water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel piping in the potable water (PW) system exposed to raw water (waste water) to manage loss of material. Visually inspect the internal surfaces of a representative sample of carbon steel and copper alloy piping, piping elements, and components in the radwaste (RW) system exposed to raw water (liquid radwaste) to manage loss of material. Visually inspect the internal surfaces of a representative sample of piping, piping elements, and components in the diesel generator starting air (DGSA) and service air (SA) systems exposed to condensation to manage loss of material.

Reference: Response to RAI 2.3.3.12 PD-4 and 2.3.3.12 AR-4.