COOPER NUCLEAR STATION LICENSE RENEWAL
REQUEST FOR ADDITIONAL INFORMATION

RAI B.1.37-3

Background
License Renewal Application (LRA) aging management program (AMP) B.1.37, "Thermal Aging and Neutron Embrittlement of Cast Austenitic Stainless Steel," manages the reduction of fracture toughness due to thermal aging and reduction of fracture toughness due to radiation embrittlement on the intended function of cast austenitic stainless steel (CASS) components. The AMP includes screening criteria to identify susceptible components and for each potentially susceptible component aging management is accomplished by either a supplemental examination or component-specific evaluation of susceptibility. The applicant claims that AMP B.1.37 is consistent with Generic Aging Lessons Learned (GALL) report aging management program (AMP) XI.M13.

Issue
The "Scope of Program" program element of the GALL report states: "For potentially susceptible components, the program provides for the consideration of the synergistic loss of fracture toughness due to neutron embrittlement and thermal aging embrittlement." Also, Standard Review Plan for Review of License Renewal Application for Nuclear Power Plants (SRP-LR), Table 3.1-2, Rev. 1, states: The program consists of (1) determination of the susceptibility of cast austenitic stainless steel components to thermal aging embrittlement, (2) accounting for the synergistic effects of thermal aging and neutron irradiation, and (3) implementing a supplemental examination program, as necessary. However, item (2) regarding the synergistic effects of thermal aging and neutron embrittlement is omitted in the updated safety analysis report (USAR) supplement described in Section A.1.1.37. This omission implies that this program may not be consistent with the GALL Report AMP XI.M13.

Request
Clarify if the program accounts for the synergistic effects of thermal aging and neutron embrittlement, and if does, explain how the synergistic effects of thermal aging and neutron embrittlement are considered in the program or provide a reference where this information is available. Also, explain the inconsistency between light-water reactor Section A.1.1.37 and SRP-LR, Table 3.1-2.

RAI 3.6-1

Background
In LRA Section 3.6.2.2.2, the applicant states the surface contamination buildup of high-voltage insulators is gradual and in most areas washed away by rain and the glazed surface aids this contamination removal. The surface contamination of insulators can be a problem in areas where there are greater concentrations of airborne particles such as near facilities that discharge soot or near the seacoast where salt spray is prevalent. The applicant claims that Cooper Nuclear Station (CNS) is not located near the seacoast or near other sources of airborne particles; therefore, surface contamination is not an aging effect requiring management. During the license renewal audit at CNS in April 2009, the staff reviewed significant condition report (SCR) 2003-1844 and noted that on October 28, 2003, a pole fire on a cross arm between the 345 kV sub yard and main unit transformer occurred. As a result of

the fire, the southern end of the beam or cross member burned through allowing the C phase to drop, but remained suspended above the ground. The southern insulator on the disconnect switch was damaged. The SCR also stated that dust fibers and particles from the harvesting of soybeans and disc operation of the adjacent farm field near the switchyard, settled on the exterior surface of the insulator bells and became wetted during high fog or light rain/mist conditions. This contamination with light moisture caused leakage current across the insulators, which resulted in a fire. The staff also noted that the identical fire also occurred in the CNS switchyard on the 345 kV Booneville wooden structure in 1997 due to the insulator contamination.

Issue
Contaminant (e.g., dust) collection on high-voltage insulators, and when with light rain or moisture, can form a film on the insulators and creates a path for electricity to flow across. A small amount of electricity can leak through this path and create phase to phase or phase to ground fault.

Request
Explain why degradation of insulator quality due to surface contamination of farm dust is not an aging effect requiring management since plant operations have experienced insulator failures at CNS.

RAI 3.6-2

Background
The most prevalent mechanism contributing to loss of conductor strength of an aluminum core steel reinforced (ACSR) transmission conductor is corrosion, which includes corrosion of the steel core and aluminum stand pitting. For ACSR conductors, degradation begins as a loss of zinc from the galvanized steel core wires. In LRA Section 3.6.2.3, the applicant states that the 4/0 ACSR transmission conductor as tested in the Ontario Hydro test bounds the CNS transmission conductors. The applicant further states that transmission conductors at CNS will have ample strength through the period of extended operation.

Issue
Loss of conductor strength due to corrosion could occur in transmission conductors. The applicant did not demonstrate how plant-specific transmission conductors at CNS would have adequate design margin to perform their intended function during the period of extended operation.

Request
Explain in detail how plant-specific transmission conductors at CNS would have adequate design margin to withstand the heavy load requirements after a degradation of conductor strength due to corrosion to perform their intended function during the period of extended operation.

RAI 3.6-3

Background
In LRA Section 3.6.2.2.3, the applicant states that the design of transmission conductor and switchyard bus bolted connection preclude torque relaxation as confirmed by plant-specific operating experience (OE). The design of switchyard bolted connections includes Bellville washers. The type of bolting plate and the use of Bellville washers is the industry standard to preclude torque relaxation.

Issue
Electric Power Research Institute (EPRI) document TR-104213, "Bolted Joint Maintenance & Application Guide," identifies a special problem with Belleville washers. It states that hydrogen embrittlement is a recurring problem with Belleville washers and other springs. When springs are electroplated, the plating process forces hydrogen into the metal grain boundaries. If the hydrogen is not removed, the spring may spontaneously fail at any time while in service.

Request
Identify if electroplated Belleville washers are currently used at CNS. If they are, explain why hydrogen embrittlement is not a problem at CNS.

RAI 2.4-1

Section XII-2.3.5.1.8 of the Cooper Nuclear Station (CNS) USAR discusses a jib crane located at the equipment hatch on the reactor building operating floor at elevation 958'-3". This jib crane is not included in Table 2.4-1 of the LRA. If this component is not included due to an oversight, please provide a description of the scoping and aging management review (AMR). If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for its exclusion.

RAI 2.4-2

Based on a review of Section 2.4.1, Reactor Building and Primary Containment, of the LRA and Table 2.4-1, it is not clear if the following components have been included in the scope of license renewal and subject to an AMR:

a) Refueling seal assembly (including refueling bellows)
b) Drywell emergency airlock
c) Drywell coating
d) Drywell shear ring
e) Drywell to reactor wall bellows
f) Ring girder designed to transfer the vertical and horizontal loads of the reactor pressure vessel skirt flange to the top of the reactor pedestal
g) Torus lateral seismic restraints (Table 2.4-1 of the LRA only lists the columns and saddles)
h) Penetration nozzles welded to the Drywell, guard pipes, flued heads, and limit stops
i) Traversing in-core probe guide tube penetrations (Ref: CNS USAR Section V-2.3.4.4)
j) Stabilizer assembly inspection ports (Ref: CNS USAR Section V-2.3.4.5)
k) Dryer-separator pit liner plate (Ref: CNS USAR Section XII-2.2.1)
l) Reactor building roof metal deck

m) Reactor building roof
n) Steam tunnel concrete roof (Table 2.4-1 of the LRA only lists concrete beams, floor slabs, interior walls and exterior walls)
o) Sliding support plates
p) Spent fuel pool liner plate leak chase system

If these components are not included due to an oversight, please provide a description of the scoping and AMR. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

RAI 2.4-3

Section 2.4.2, Water Control Structures, of the LRA states that the intake structure is provided with a crane for equipment maintenance. Table 2.4-2 of the LRA does not list this crane to be within the scope of license renewal. If this component is not included due to an oversight, please provide a description of the scoping and AMR. If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for its exclusion.

RAI 2.4-4

Section 2.4.2 of the LRA states that the traveling screens and trash racks in the intake structure prevent debris from entering the circulating water pumps and service water pump bays. Traveling screen casing and associated framing are included in Table 2.4-2. However, Table 2.4-2 does not list the trash racks to be within the scope of license renewal. If trash racks are not included due to an oversight, please provide a description of the scoping and AMR. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

RAI 2.4-5

Section XII-2.2.7.2 of the CNS USAR states the following:

> "A three-foot wide by four-foot high hole has been installed near the far north end of the guide wall. A gate and gate frame assembly has also been provided to allow for opening and/or closing of the hole depending on the forecast river levels. The purpose of the hole is to provide a flow path from the Missouri River to the Service Water pump bay during low river water level conditions needed to ensure Service Water pump operability."
>
> The guide wall is included in Table 2.4-2 of the LRA. However, Table 2.4-2 does not list the gate and the associated frame assembly to be within the scope of license renewal. If these components are not included due to an oversight, please provide a description of the scoping and AMR. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

RAI 2.4-6

Section 2.4.2 of the LRA discusses sluice gates and their function to provide a suction path for the service water pumps should the inlet to service water bay become clogged. Table 2.4-2 does not list the sluice gates to be within the scope of license renewal. If the sluice gates are not included due to an oversight, please provide a description of the scoping and AMR. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

RAI 2.4-7

Section 2.4.2 of the LRA discusses a concrete skirt, sheet piling along the river face and rip-rap in front of the intake structure providing scour protection. Table 2.4-2 does not list these components to be within the scope of license renewal and subject to an AMR. Please provide the basis for the exclusion of these components from the scope of license renewal.

RAI 2.4-8

As discussed in Section 2.4.3, “Turbine Building, Process Facilities and Yard Structures,” of the LRA, the multi-purpose facility is supported on piles. Table 2.4-3 of the LRA only lists the concrete foundation and does not list these piles. If the foundation piles are not included due to an oversight, please provide a description of the scoping and AMR. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

RAI 2.4-9

Section 2.4.3 of the LRA discusses turbine generator pedestal structure. Since Table 2.4-3 of the LRA combines many components under a single component group (e.g., concrete beam, columns, floor slab and interior walls), it is not clear if the turbine generator pedestal is within the scope of license renewal and subject to an AMR. Please provide a description of the scoping and AMR or provide the basis for its exclusion.

RAI 2.4-10

Table 2.4-3 of the LRA only lists roof decking and concrete roof slab. Please confirm that the built-up roofing system was not used in construction of various buildings covered in Section 2.4.3 of the LRA. Otherwise, provide a description of the scoping and AMR or provide the basis for the exclusion of the built-up roofing system from the scope of license renewal.

RAI 2.4-11

Table 2.2-3, Structures within the Scope of License Renewal, of the LRA lists cranes, trolleys, monorails and hoists as components within the scope of license renewal. Table 2.4-3 of the LRA only lists monorails, crane rails and girders. Please provide the basis for excluding cranes (e.g., turbine building crane) and their associated sub-components (bridge, trolley, hardware, etc.), located within the in-scope structures described in Section 2.4.3 of the LRA, from the scope of license renewal.

RAI 2.4-12

Section 2.4.3 of the LRA describes the exhaust stack on top of the diesel generator building roof as nonessential. Table 2.4-3 does not include the exhaust stack within the scope of license renewal. Please verify that this component does not have an intended function relative to potential spatial interaction based on the criterion of 10 CFR 54.4(a)(2).

RAI 2.4-13

Table 2.2-3, Structures within the Scope of License Renewal, of the LRA lists the turbine building (including appendages) as structures within the scope of license renewal. Section 2.4.3 of the LRA defines the water treatment area, machine shop, exhaust fan room, and heating boiler room as turbine building appendages, but no specific information relative to these structures are provided to verify the completeness of listed components in Table 2.4-3 and Table 2.4-4. Please provide a more detailed description of the turbine building appendages, and confirm that the entire turbine building and its appendages are within the scope of license renewal and that the components applicable to these facilities fall within the listed components in Table 2.4-3 and Table 2.4-4.

RAI 2.4-14

Section 2.4.3 of the LRA discusses the Z Sump, an underground steel lined concrete tank, located beneath the early release point tower. Table 2.4-3 of the LRA does not list this concrete tank to be within the scope of license renewal and subject to an AMR. If this component is not included due to an oversight, please provide a description of the scoping and AMR. If it is covered somewhere else in the LRA, please indicate the location. If it is excluded from the scope of license renewal, please provide the basis for its exclusion.

RAI 2.4-15

Table 2.4-1, Reactor Building and Primary Containment, lists shield plugs as in-scope components. However, for various structures covered in Section 2.4.3, Table 2.4-3 of the LRA does not list shield plugs as in-scope components and subject to an AMR. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

RAI 2.4-16

As described in the CNS USAR Section XII-2.2.15, the optimum water chemistry gas generator (OWCGG) building is a Class II structure located along the north wall of the turbine building. Table 2.2-4 of the LRA indicates that this building has been excluded from the scope of license renewal. Please provide the technical basis for its exclusion from the scope of license renewal. Specifically, verify that this structure does not have an intended function relative to potential spatial interaction based on the criterion of 10 CFR 54.4(a)(2).

RAI 2.4-17

Table 2.4-4 of the LRA does not include the following component types, as listed below. If they are covered somewhere else in the LRA, please indicate the location. If they are excluded from the scope of license renewal, please provide the basis for their exclusion.

1. Shielding for high energy line break (Table 2.4-4 only lists pipe whip restraints),
2. Grout pads for building structural column base plates, and
3. Fire dampers

RAI B.1.31-2

Background
LRA Section B1.31 states that the acceptance criteria are defined in specific inspection or test procedures, and that the procedures confirm component integrity by verifying the absence of aging effects or by comparing applicable parameters to limits based on applicable intended functions established by plant design basis. The majority of the acceptance criteria given in CNS-RPT-07-LRD07, Revision 2, "Aging Management Program Evaluation Results - Non-Class 1 Mechanical," Attachment 2, “Periodic Surveillance and Preventive Maintenance Activities, were either, “No unacceptable loss of material,” or “No unacceptable cracking or change in material properties.”

By contrast, GALL report Appendix A, Section A.1.2.3.6, "Acceptance Criteria" indicates that the bases for the criteria should be described and the criteria against which the need for corrective action will be evaluated, should ensure that the structure and or component intended function(s) are maintained under all current licensing basis design conditions. In addition, this section notes that acceptance criteria could be specific numerical values, or could consist of a discussion of the process for calculating specific numerical values. If acceptance criteria do not permit degradation, then there is no need to discuss current licensing basis design loads, since the structure or component should continue to function as originally designed.

Issue
The information provided does not describe the bases for the acceptance criteria. Although LRA Section B.1.31 states that the procedures confirm the absence of aging effects, apparently aging effects may be tolerated, but just cannot be unacceptable. However, the term “unacceptable” is not quantified and the process for determining “unacceptable” is not provided.

Request
Provide the basis for the acceptance criteria given for each component or system described in the LRA Section B.1.31, “Periodic Surveillance and Preventive Maintenance,” and specifically describe how the term “unacceptable” will be quantified.