

**POINT BEACH NUCLEAR PLANT, UNITS 1 AND 2 (PBN)
SUBSEQUENT LICENSE RENEWAL APPLICATION (SLRA)
REQUEST FOR ADDITIONAL INFORMATION (RAI)
SAFETY - SET 6**

SLRA Section B.2.3.21, “Selective Leaching”

Regulatory Basis

Section 54.21(a)(3) of Title 10 of the Code of Federal Regulations (10 CFR) requires an applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. One of the findings that the U.S. Nuclear Regulatory Commission (NRC) staff must make to issue a renewed license (10 CFR 54.29(a)) is that actions have been identified and have been or will be taken with respect to managing the effects of aging during the period of extended operation on the functionality of structures and components that have been identified to require review under 10 CFR 54.21, such that there is reasonable assurance that the activities authorized by the renewed license will continue to be conducted in accordance with the current licensing basis. In order to complete its review and enable it to make a finding under 10 CFR 54.29(a), the staff requires additional information in regard to the matters described below.

RAI B.2.3.21-1 [Breakout Topic #2: Exclusion of buried components from scope based on external coatings and cathodic protection]

Background:

SLRA Section B.2.3.21, “Selective Leaching,” states, in part, that “[t]he PBN Selective Leaching AMP will be consistent with the ten elements of NUREG-2191, Section XI.M33, ‘Selective Leaching.’”

GALL-SLR Report AMP XI.M33, “Selective Leaching,” states that depending on plant-specific operating experience (OE) and implementation of preventive actions, certain components may be excluded from the scope of this program in each 10-year inspection interval as follows:

- The external surfaces of buried components that are externally-coated in accordance with Table XI.M41-1, [“Preventive Actions for Buried and Underground Piping and Tanks,”] of GALL-SLR Report AMP XI.M41, “Buried and Underground Piping and Tanks,” and where direct visual examinations of buried piping in the scope of license renewal have not revealed any coating damage.
- The external surfaces of buried gray cast iron and ductile iron components that have been cathodically protected since installation and meet the criteria for Preventive Action Category C in GALL-SLR Report AMP XI.M41, Table XI.M41-2, “Inspections of Buried and Underground Piping and Tanks.”

Based on its audit and review of the SLRA, the staff noted the following: (a) cathodic protection system performance will provide OE to determine whether the Selective Leaching program may exclude buried and cathodically protected components from scope; (b) a majority of potentials measured during the 2015 cathodic protection survey did not meet the -850 mV polarized potential criterion; (c) cathodic protection systems at Point Beach were originally installed to provide corrosion control for the containment structures and buried circulating water piping; (d) there is uncoated buried piping in the fire protection system; and (e) as amended by letter dated April 21, 2021 (ADAMS Accession No. ML211111A155), buried fire protection piping at PBN includes the following material types susceptible to selective leaching: ductile iron and gray cast iron.

Issue:

1. External Coatings Exclusion

Buried components can be excluded from the scope of the Selective Leaching program based on the external coatings being provided; however, the staff seeks clarification regarding why this exclusion is applicable at PBN based on the applicant’s documentation [FPLCORP00036-REPT-058, “Point Beach Units 1 and 2 Subsequent License Renewal Aging Management Program Basis Document – Buried and Underground Piping and Tanks,” Revision 0] that indicates that there is uncoated buried piping in the fire protection system.

2. Cathodic Protection Exclusion

Buried components can be excluded from the scope of the Selective Leaching program based on cathodic protection efficacy; however, the staff seeks clarification regarding why this exclusion is applicable at PBN based on the following: (a) cathodic protection systems at PBN were not originally installed to provide corrosion control for buried components susceptible to selective leaching; (b) the SLRA does not describe how the criteria for Preventive Action Category C have been met for buried gray cast iron and ductile iron fire protection system piping since installation; and (c) potentials measured during the 2015 cathodic protection survey did not meet the criteria for Preventive Action Category C (i.e., cathodic protection acceptance criteria were not met 80 percent of the time).

Request:

State the basis for why the above exclusions for buried components are applicable to the Selective Leaching program at PBN. Alternatively, revise the SLRA as appropriate to reflect that these exclusions are not applicable to the Selective Leaching program at PBN.

RAI B.2.3.21-2 [Breakout Topic #3: Inspection sample size for gray cast iron piping exposed to soil]

Background:

SLRA Table 3.3.2-6, "Fire Protection System – Summary of Aging Management Evaluation," states that loss of material due to selective leaching for gray cast iron piping exposed to soil will be managed by the Selective Leaching program.

SLRA Section B.2.3.21 states the following:

- Each of the one-time and periodic inspections for the various material and environment populations at each unit comprises a 3 percent sample or a maximum of 10 components.
- For raw water, waste water, and soil environments, the AMP includes opportunistic and periodic visual inspections of selected components that are susceptible to selective leaching, coupled with mechanical examination techniques. Destructive examinations of components to determine the presence of and depth of dealloying through-wall thickness are also conducted.

The “Plant Specific Operating Experience” summary in SLRA Section B.2.3.21 does not describe any operating experience or results of inspections related to gray cast iron piping exposed to soil.

NUREG-2222, “Disposition of Public Comments on the Draft Subsequent License Renewal Guidance Documents NUREG–2191 and NUREG–2192,” states the following regarding the staff’s basis for reducing the extent of inspections for selective leaching during the subsequent period of extended operation (i.e., 3 percent with a maximum of 10 components per GALL-SLR guidance) when compared to the extent of inspections for selective leaching during the initial period of extended operation (i.e., 20 percent with a maximum of 25 components per GALL Report, Revision 2 guidance):

1. Opportunistic inspections will be conducted throughout the period of extended operation whenever components are opened, buried, or submerged surfaces are exposed, whereas opportunistic inspections were not recommended in the previous version of AMP XI.M33;
2. Destructive examinations provide a more effective means to detect and quantify loss of material due to selective leaching;
3. The slow growing nature of selective leaching generally coupled *with the inspections conducted prior to the initial period of extended operation* [emphasis added] provides insights into the extent of loss of material due to selective leaching that can be used in the subsequent period of extended operation;
4. The staff’s review of many license renewal applications has not revealed any instances where loss of intended function has occurred due to selective leaching;
5. The staff’s review of industry operating experience has not detected any instances of loss of material due to selective leaching, which resulted in a loss of intended function for the component; and
6. Regional inspector input (provided based on IP 71003, “Post-Approval Site Inspection for License Renewal,”) that selective leaching has been noted during visual and destructive inspections; however, no instances have been identified where there was the potential for loss of intended function.

The NRC issued Information Notice (IN) 2020-04, "Operating Experience Related to Failure of Buried Fire Protection Main Yard Piping," to inform the industry of OE involving the loss of function of buried gray cast iron fire water main yard piping due to multiple factors, including graphitic corrosion (i.e., selective leaching), overpressurization, low-cycle fatigue, and surface loads. As noted in the IN, a contributing cause to the failures of buried gray cast iron piping at Surry Power Station (SPS) was the external reduction in wall thickness at several locations due to graphitic corrosion.

Issue:

The recommended extent of inspections in GALL-SLR AMP XI.M33 is based on the six conditions noted by the staff in NUREG-2222. The staff's comparison of these six conditions to the Selective Leaching program at PBN follows:

- Based on its review of SLRA Section B.2.3.21, the staff notes that opportunistic inspections and destructive examinations for selective leaching will be performed, consistent with the first and second conditions in NUREG-2222.
- Based on its review of plant-specific operating experience in SLRA Section B.2.3.21, the staff could not determine if selective leaching inspections have been conducted for gray cast iron piping exposed to soil. Based on this observation (i.e., inspections for this material and environment combination may not have been performed prior to the initial period of extended operation), the third condition in NUREG-2222 may not be met at PBN for gray cast iron piping exposed to soil.
- The fourth, fifth, and sixth conditions in NUREG-2222 focus on the staff's review of industry OE not identifying any instances of loss of material due to selective leaching which had resulted in a loss of intended function for the component. Based on recent industry OE at SPS (as documented in IN-2020-04), the last three conditions in NUREG-2222 are no longer applicable for gray cast iron piping exposed to soil. Since these conditions are no longer applicable (i.e., there is now industry OE involving loss of material due to selective leaching which resulted in a loss of intended function for gray cast iron piping exposed to soil), the staff requires additional information to determine if the reduced extent of inspections in GALL-SLR AMP XI.M33 are appropriate for this material and environment combination.

Request:

Provide additional OE, or other technical justification (e.g., discussion of historical cathodic protection efficacy with respect to buried gray cast iron piping, discussion of type(s) of external coatings utilized on buried gray cast iron piping, discussion of soil corrosivity and backfill quality in the vicinity of buried gray cast iron piping, discussion of external surface loss of material rates for buried steel or cast iron piping), to demonstrate that the extent of inspections in GALL-SLR AMP XI.M33 (i.e., 3 percent with a maximum of 10 components) are appropriate for gray cast iron piping exposed to soil.