BREAKOUT QUESTIONS
Aging Management Audit

Clinton Power Station,
Unit 1
License Renewal Application

August 12, 2024 – February 11, 2025

LRA Section : 3.2, 3.3 and B.2.1.2, Water Chemistry

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	N/A	N/A	The Water Chemistry AMP basis document states that Clinton operates with a feedwater iron goal of [[ ]] due to a partial filtration. This is higher than the EPRI good practice value of [[ ]]. The AMP Basis document also states that Clinton plans on installing 100% pre-filters by first quarter of 2024 because these pre-filters are needed to meet the good practice value outlined in the EPRI Guidance.	a) Does having elevated feedwater iron affect Clinton's ability to meet the needed Feedwater Iron (Quarterly Average) parameter as outlined in the EPRI Guidelines. b) If the 100% pre-filters are installed, what has been the impact on the measured feedwater iron content relative to the EPRI Guidelines good practice value?
2	3.2	3.2-47	LRA Table 3.2.2-3 states that the Water Chemistry and One-Time Inspection programs will manage loss of material for nickel alloy rupture discs exposed to a treated water (internal environment). This item cites generic note G and plant-specific note 2 which states, "Nickel alloy and treated water environment does not appear in NUREG-1801 Rev. 2. Per use of operating experience, NUREG-2191 recommends that the Water Chemistry (B.2.1.2) program and the One-Time Inspection (B.2.1.21) program be used." Because this item is not listed in the GALL Report the staff requests additional clarification and information about this item.	a) Please clarify what information in NUREG-2191 is being referenced in plant-specific note 2. b) Please clarify the nature of the treated water environment including the water temperature.

3	3.3	3.3-250	LRA Table 3.3.2-20, for the Standby Liquid Control (SLC) system, states that the Water Chemistry and One-Time Inspection programs will be used to manage the loss of material for carbon steel piping in a sodium pentaborate solution environment. Plant-specific Note 1 states, “The Water Chemistry (B.2.1.2) program manages the aging effects on carbon steel Standby Liquid Control (SLC) System components subject to the sodium pentaborate environment by monitoring and controlling SLC System storage tank treated water chemistry. Aging effects on carbon steel exposed to a sodium pentaborate environment are established using a treated water environment.” Because SLC systems are constructed primarily from stainless steels (e.g., NUREG/CR-6001, ML040340671), the staff requests additional information about the steel components and conditions of exposure.	Please provide the following information about the carbon steel components subject to loss of material and in a sodium pentaborate internal environment. a) The specific components requiring aging management. b) Location of the components in the SLC system. c) Amount of time the components are exposed to the sodium pentaborate solution and expected corrosion rate. d) A description of the sodium pentaborate solution to which the components are exposed, and how it differs (if it differs) from the sodium pentaborate solution in the SLC storage tank.

LRA Section/AMP: B.2.1.42, Internal Coatings LRA Section/AMP: B.2.1.42, Internal Coatings

Question Number	LRA/SLRA Section	LRA/SLRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.42	B-180 to B-182	LRA Section B.2.1.42, Program Description, says this aging management program (AMP) will manage aging effects for internal coatings/linings by performing periodic visual inspections of internal coatings/linings exposed to closed-cycle cooling water, raw water, waste water, condensation and fuel oil. The Program Basis Document CL-PBD-AMP-XI.M42, Rev. 1 further states that components in the scope of the AMP come from the following systems: • Closed Cycle Cooling Water System • Control Room Ventilation System • Diesel Generator and Auxiliaries System • Fire Protection System • Main Steam System • Nonsafety-Related Ventilation System • Open Cycle Cooling Water System • Primary Containment Ventilation System • Safety-Related Ventilation System • Standby Gas Treatment System LRA Section B.2.1.42, Operating Experience, describes operating experience examples from three of the above systems (Closed Cycle Cooling Water System, Diesel Generator and Auxiliaries System, and the Control Room Ventilation System) and states that these examples provide objective evidence that this program will be effective in assuring that intended functions are maintained consistent with the current licensing basis for the period of extended operation.	Discuss operating experience, from the following in-scope systems, if available, that provides objective evidence that LRA Section B.2.1.42 AMP inspections will be effective in identifying and managing aging effects and loss of coating integrity for the following in-scope systems: • Fire Protection System • Main Steam System • Nonsafety-Related Ventilation System • Open Cycle Cooling Water System • Primary Containment Ventilation System • Safety-Related Ventilation System • Standby Gas Treatment System

2	B.2.1.42	B-182	LRA Section B.2.1.42, Operating Experience, describes the cleaning of a Division 2 diesel generator fuel oil storage tank in 2015 in which personnel identified 14 separate indications related to the integrity of the tank internal coatings system. One of these indications was a 3”x1” area where the coatings had peeled off. AR 012566881 from the Clinton Audit Portal further states that there was loose paint around the edges of this 3”x1” delamination.	Discuss if the 3”x1” delamination/peeling in the fuel oil storage tank coating, as described in the LRA and AR 012566881, has been repaired or is scheduled to be repaired. If not repaired yet, describe activities performed to prevent the loose paint adjacent to the delamination from coming loose and causing downstream effects.
3			AR 00539602 from the Clinton Audit Portal describes delamination/peeling (8”x1.5”) of the fuel oil storage tank internal coating that was discovered in 2006. There has been no more discussion of this delamination/peeling in more recent operating experience discussion.	Discuss if the 8”x1.5” delamination/peeling in the fuel oil storage tank coating, as described in AR00539602 in 2006, has been repaired. If not repaired, explain why this is no longer a concern to the integrity of the internal coatings/linings.

<u>LRA Section: A.2.1.27, B.2.1.27, Monitoring of Neutron-Absorbing Materials Other Than Boraflex</u>

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.27	B-119	On page B-119 of the LRA the enhancement to the Monitoring of Neutron-Absorbing Materials Other Than Boraflex program states that NES rack (Boral Material) inspections and testing per NEI 16-03-A guidance at frequency not to exceed 10 years during the period of extended operation will be performed to ensure proper neutron attenuation has been confirmed. The type of testing being conducted, and the programmatic details of the testing program are unclear to the staff.	• Please confirm which revision of NEI 16-03-A is being referred to in the application. • Please outline the programmatic details of the Boral monitoring program including the type of monitoring program as outlined in NEI 16-03-A guidance (coupons, in-situ testing, i-LAMP, etc.), acceptance criteria and actions that will be taken if acceptance criteria are not met.

2	B.2.1.27	B-120	Page B-120 of the application states, “Management of NES Racks containing Boral is based on operating experience of other facilities utilizing Boral that have coupons installed.” The AMP basis document outlines that this is done using the “sister-pool criteria” approach. Whether this approach will continue into the PEO is unclear to the staff.	• Will the approach of relying on operating experience from other sites utilizing Boral coupons based on “sister-pool” criteria continue in the PEO?
				• If so, please address the following:
				  o Has a plant-specific analysis as outlined in the SE for NEI 16-03 Rev 1 been performed to show that the sister-plant bounds Clinton?
				  o How is this approach consistent with the GALL report when testing is not being conducted?

3	A.2.1.27	A-28	In the USAR supplement on page A-28 it states, "The Monitoring of Neutron-Absorbing Materials Other than Boraflex is an existing condition monitoring program that includes periodic inspection and analysis of test coupons of the neutron-absorbing material in the spent fuel racks to determine if the neutron-absorbing capability of the material has degraded." However, the applicability of this statement for Boral is unclear to the staff as there are no Boral test coupons.	• Please clarify how this is applicable to Boral since there are no Boral test coupons.
4	B.2.1.27	B-119	Page B-119 of the application states, "The Monitoring of Neutron-Absorbing Materials Other than Boraflex aging management program includes monitoring of changes in physical characteristics of the material in the spent fuel storage racks through visual inspections, dimensional measurements, neutron attenuation testing, and weight and specific gravity measurements of test coupons. Results of each coupon surveillance are documented and retrievable for purposes of trending. Acceptance criteria thresholds are established as indicators of potential adverse trends in the condition of the neutron-absorbing material to ensure corrective actions are taken prior to compromising the five percent subcriticality margin as contained within the spent fuel pool criticality analysis." This staff is unclear of how this applies to Boral as coupons are not being utilized for the testing of the Boral Material.	• Please clarify how this is applicable to Boral if there are no Boral test coupons.

5	B.2.1.27	B-119	Element 3 of GALL Report AMP XI.M40 "Parameters Monitored/Inspected" states, "For these materials, gamma irradiation and/or long-term exposure to the wet pool environment may cause loss of material and changes in dimension (such as gap formation, formation of blisters, pits and bulges) that could result in loss of neutron-absorbing capability of the material. The parameters monitored include the physical condition of the neutron-absorbing materials, such as in-situ gap formation, geometric changes in the material (formation of blisters, pits, and bulges) as observed from coupons or in situ, and decreased boron areal density, etc. The parameters monitored are directly related to determination of the loss of material or loss of neutron absorption capability of the material(s)." The AMP basis document states that Clinton currently utilizes operating experience from other plants utilizing Boral coupons using the sister criteria approach. It also states that there will be an enhancement to this element to perform NES rack inspections and testing for Boral material per NEI 16-03-A guidance on intervals not to exceed 10 years.	• Please state how the enhancement identified in the application will allow for the Monitoring of Neutron-Absorbing Materials Other than Boraflex program to be consistent with element 3 of GALL Report XI.M40 given that no plant-specific testing is being performed on the Boral at Clinton.

6	B.2.1.27	B-119	Element 4 of GALL Report AMP XI.M40, "Detection of Aging Effects" states, "The loss of material and the degradation of the neutron absorbing material capacity are determined through coupon and/or direct in-situ testing. Such testing should include periodic verification of boron loss through areal density measurement of coupons or through direct in-situ techniques, which may include measurement of boron areal density, geometric changes in the material (blistering, pitting, and bulging), and detection of gaps through blackness testing. The frequency of the inspection and testing depends on the condition of the neutron-absorbing material and is determined and justified with plant-specific operating experience by the licensee, not to exceed 10 years." The application provides an enhancement to this element to perform NES rack (Boral material) inspections and testing per NEI 16-03-A guidance at a frequency not to exceed 10 years during the period of extended operation to assure proper neutron attenuation is maintained.	• Please state how the enhancement identified in the application will allow for the Monitoring of Neutron-Absorbing Materials Other than Boraflex program to be consistent with element 4 of GALL Report XI.M40 given that no plant-specific testing is being performed on the Boral at Clinton.

7	B.2.1.27	B-119	Element 5 of GALL Report AMP XI.M40, “Monitoring and Trending” states, “The measurements from periodic inspections and analysis are compared to baseline information or prior measurements and analysis for trend analysis. The approach for relating the measurements to the performance of the spent fuel neutron absorber materials is specified by the applicant, considering differences in exposure conditions, vented/non-vented test samples, and spent fuel racks, etc.” The AMP basis document states that monitoring and trending will be done in accordance with NEI 16-03-A guidance. The application also contains an enhancement for this program element to perform NES rack inspections and testing for Boral material per NEI-16-03-A guidance on intervals not to exceed 10 years.	• Please state how monitoring and trending will be done in accordance with guidance contained in NEI 16-03-A. • Please state how the enhancement identified in the application will allow for the Monitoring of Neutron-Absorbing Materials Other than Boraflex program to be consistent with element 5 of GALL Report XI.M40 given that no plant-specific testing is being performed on the Boral at Clinton.
8	B.2.1.27	B-119	Element 6 of GALL Report AMP XI.M40, “Acceptance Criteria” states, Although the goal is to ensure maintenance of the 5% sub-criticality margin for the spent fuel pool, the specific acceptance criteria for the measurements and analyses are specified by the applicant.” The AMP basis document states that the acceptance criteria for Boral material is per NEI 16-03-A. The application also contains an enhancement for this program element to perform NES rack inspections and testing for Boral material per NEI-16-03-A guidance on intervals not to exceed 10 years.	• Please clarify which acceptance criteria outlined in NEI 16-03-A are being used at Clinton for Boral. • Please state how the enhancement identified in the application will allow for the Monitoring of Neutron-Absorbing Materials Other than Boraflex program to be consistent with element 6 of GALL Report XI.M40 given that no plant-specific testing is being performed on the Boral at Clinton.

9	B.2.1.27	B-120	Page B-120 of the LRA states, "Work Orders document the Metamic inspections performed in January 2009, August 2011 and September 2019, respectively." It also states, that "visual inspections of these coupons indicate no signs of bubbling, blistering, cracking or flaking was observed. All dimensional measurements were within the acceptance criteria." The application does not include a discussion of the inspection done in 2015. It is also unclear to the staff when neutron attenuation testing was performed as visual inspections are only discussed in the application.	• Please discuss the type of testing done during the 2015 inspection and the results of that inspection. • Please verify when neutron attenuation testing was done on the Metamic coupons.
10	N/A	N/A	In the SE for amendment 170 it states that, "the coupons will be removed from the SFP for testing after 2,4,8,12,20,28 and 36 years for physical observations and/or confirmatory testing." It also states that, "the licensee will perform confirmatory neutron attenuation testing after 4, 12 and 20 years." The last interval for each sampling type, 36 years for physical inspection and 20 years for neutron attenuation testing, fall within the timeline of the PEO. Beyond these 2 samples the schedule for the Metamic coupons during the PEO is unclear to the staff.	• Please discuss the coupon testing schedule for both physical observations and neutron attenuation testing for the Metamic coupons during the PEO. Including verification that the schedule is consistent with periodicity described in GALL. • Please discuss what provisions are in place to ensure that there are an adequate number of coupons remaining for testing during the period of extended operation.

LRA Section B.2.1.10, Flow-Accelerated Corrosion

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	CL-PBD-AMP-XI.M17	(p18/36) Sect 3.6 Accept Criteria	"For wall thinning due to erosion, a minimum safety factor of 1.5 is applied to the predicted wear rate determination. (Ref ER-AA-430-1004, Erosion in Piping and Components (EPC) Section 4.7.2)" EPRI 3002005530 Jul-2015 (Ref 4.2 in the Altran Rpt 14-0358-TR-001), Section 6.10 pertaining to safety factor being applied to the fitness for service and reinspection interval determination: "The minimum safety factor should never be less than 2.0."	Provide technical basis to justify using a less conservative minimum safety factor (i.e., 1.5) in the EPC program than the minimum safety factor (i.e., 2.0) prescribed in industry guidelines for erosion.
2	CL-PBD-AMP-XI.M17	(p24/36) Section 3.10 3rd para	"Based on a review of SLR guidance document, there were no changes identified to optimize the **Buried and Underground Piping and Tanks** aging management effectiveness."	Editorial: Confirm that this should say "Flow-Accelerated Corrosion" instead of Buried Piping AMP
3	Altran Rpt 14-0358-TR-001, Rev 0	(p20/485) Section 2.6.4	Att E, "Line Level EPC Susceptibility Evaluation" includes 11 locations in the Component Cooling Water system as being susceptible to cavitation (p70/485). These locations are noted in Att G P&IDs (p172 - 177/485) CL-AMPBD-CTW, Rev 0, Closed Treated Water Inspection Sampling Basis Document, Att 7 (p45/45) lists pipe sections 1CC48AA & 1CC48AB (M05-1032, sht 2) and 1CC07A (sht 1).	Line susceptibility evaluation in Altran report does not show the susceptible locations identified by site OpEx. Discuss criteria used by Altran and explain why susceptible cavitation locations do not include OpEx locations. Discuss whether Altran report should be re-performed because of this discrepancy. If Altran criteria is valid, then discuss why erosion sampling for CTW does not include any of the 11 identified locations

4	Altran Rpt 14-0358-TR-001, Rev 0	K-2 & K-3	Att K, Recommended Inspections for Erosive Mechanisms includes three locations for the HPCS system. LRA Table 3.2.2-1 does not include an AMR item for Wall Thinning.	[Errors on Dwg LR-CPS-M05-1074: 3rd orifice on the 10” test line appears to be incorrectly labeled as 1E22F359, Line 1HP19B-10” is mislabeled as 1HP20A-3/4”] Discuss why LRA Table for HPCS does not include locations from the Erosion Susceptibility Evaluation recommended inspection list.
5	CL-PBD-AMP-XI.M21A	(p7/51) Section 2.1	The Closed Treated Water Systems (CTWS) program description: “*This program also manages wall thinning due to erosion*.” [This issue also applies to the Open-Cycle Cooling Water System AMP, which the Altran Report Section 1.3, Scope says was excluded from the EPC program.]	Methodology for determining service life does not appear to be provided in the CTWS. The EPC program specifies 1.5 safety factor. Discuss whether erosion evaluations conducted for the CTWS AMP will use the same approach as EPC. Additionally, the staff would like to know why management of all erosion is not done under the EPC program.
6	CL-AMPBD-CTW, Rev 0, Att 7	(p45/45)	CL-AMPBD-CTW, Rev 0, Closed Treated Water Inspection Sampling Basis Document, Att 7 (p45/45) lists pipe sections 1CC48AA & 1CC48AB (M05-1032, sht 2)	Confirm that pipe sections are shown on sht 3, and not sht 2. Pipe 1CC48AB-6” is upstream of 1CC056B, whereas 1CC48AA-6” is downstream of 1CC056A. Verify location to be inspected in Att 7.

7	LRA Section B.2.1.12	(pB-59)	Open-Cycle Cooling Water System OpEx (example 1) notes that a pinhole leak in a room cooler caused by wall thinning due to erosion/corrosion in the copper tubing. An extent of condition identified many other room coolers having similar configuration and service conditions. The tube failure was due to erosion-corrosion caused by turbulence associated with coil and adjacent fitting. Walkdowns of other room coolers did not identify any leakage issues. ER-AA-430-1004 (EPC Guide), Section 4.11, Sample Expansion notes that additional inspections will be performed, which may include components of similar geometry.	Are there any planned inspections (other than a visual inspection looking for leakage) of other room coolers due to the “similar configuration and service conditions” of the erosion mechanism? Will erosion inspections that are conducted through the OCCWS AMP, follow the same guidance as that provided in the EPC?

LRA Section B.2.1.10, Flow-Accelerated Corrosion Follow-Up Questions

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			Follow up question to FAC question number 1 (See Supplement 1 draft change #24: *Safety factors to be consistent with the direction outlined in Section 6.10 of EPRI 3002023786, Rev 1* (p47/110))	Confirm that ER-AA-430-1004 will be revised to provide better guidance relating to when a safety factor less than 2.0 can be justified, but never less than 1.5. (e.g., for Exhibit 4, is the “default” safety factor going to stay as 1.5 or will it be changed to 2.0?)
2			Follow up to FAC question number 1 ER-AA-430-1004, Section 4.5.1.3, Re-Inspections: Determination of which components require re-inspection will be accomplished by querying the EPC database. At a minimum, the inspections will be performed on all components with a next scheduled inspection (NSI) that is less than or equal to the upcoming outage. NSI is based on engineering judgment.	If NSI is determined based on Section 4.7.4, “Calculation of Next Scheduled Inspection,” then how can NSI be based on engineering judgment?
3			Follow up to FAC question number 3 Given that the Erosion Susceptibility Evaluation (ESE) did not predict the locations identified by plant-specific operating experience, provide more detailed information about the criteria used for predicting locations susceptible to erosion. (Because the ESE did not predict locations of actual erosion, then there is reasonable likelihood that other probable erosion locations may not have been identified.	Did the ESE include all applicable valve throttling information?

4			Follow up to FAC Question number 5 The response to question number 5 states: The inspection sample basis document [CL-AMPBD-CTW] will be revised to state that re-inspections are performed based on wear rates and calculated remaining life as described in CL-PBD-MAP-XI.M17. _A minimum safety-factor of 1.5 will be used_."	Will CL-AMPBD-CTW be revised (specifically the last underlined sentence) based on the response from FAC question number 1?
5			Follow up to FAC Question number 5 The EPC Section 4.11, "Sample Expansion," includes guidance related to additional inspections if erosion is identified (i.e., wall thickness less than minimum acceptable or significant unexpected wall thinning).	Should sample expansion guidance, consistent with the EPC, be added to CL-AMPBD-CTW? (If not, why not?)
6			Follow up to FAC Question number 7 PM158457-03 & PM 158458-03 (cited in the revised response) are for the ECCS HPCS Pump Room Coolers, not the RHR C Pump Room Cooler. The RHR 1C Pump Room Cooler appears to be PM158456-03.	Are the PMRQs for all of the room cooler "Inspect/Clean/Test" basically the same as far as specifying 4-year eddy current testing? What is PMRQ 165994-01, "NDE-RHR 1C Pump Room Cooler" and how does that differ from the Inspect/Clean/Test PMRQ?
7			Follow up to FAC Question number 7 Open-Cycle Cooling Water System (OCCWS) OpEx Example 1 refers to "a pinhole leak caused by wall thinning due to erosion/corrosion in the copper tubing." The associated CAP document is AR 04296225. Assignment #10 is for reviewing the PowerLabs failure analysis and analyzing the results. The "In Progress Notes" state: "The leak location exhibited classic horseshoe and comet-tail shaped features." EPRI 106611, Flow-Accelerated Corrosion in Power Plants," uses "horseshoe pits" to describe flow-accelerated corrosion, which it typically never seen in service water systems due to the high oxygen content in the water.	Is the heat exchanger tube degradation from the OCCWS OpEx due to flow-accelerated corrosion or (more likely?) from erosion?

8			Follow up to FAC Question number 7 GL 89-13 Response (Jan-29-1990) states: Maintenance procedures will be established for erosion inspections, removal of excessive accumulations of biofouling agents, corrosion products and silt.	1. Why didn't existing maintenance procedures for performing erosion inspections (as provided in response to GL 89-13) detect wall thinning due to erosion in the RHR C room cooler south cooling coil? 2. Are the existing inspections (visual & eddy current) capable of detecting the wall thinning (i.e., inlet and outlet end erosion-corrosion in the tubing and fittings) as documented for the RHR C room cooler? 3. What did the prior inspection results (before the tube leak) from the RHR C room cooler south cooling coil show about wall thinning in the area where the leak was found? 4. What extent of condition evaluation, as provided in ER-AA-5400-1001, Attachment 10, was performed and what did the results of the extent of condition inspections show?
9			Follow up to FAC Question number 7 For Open-Cycle Cooling Water System OpEx (example 1), which addresses an erosion issue in the associated AMP, the LRA states: This example provides objective evidence that the existing GL 89-13 AMP activities are being effectively implemented to identify and manage aging effects of in-scope heat exchangers serviced by raw water, and that the results of inspection activities are used to inform and enhance the program. Deficiencies identified during inspection activities are entered into the corrective action program and appropriate corrective actions are taken to evaluate and correct the deficiencies.	1. Provide discussion how this OpEx example shows that the existing GL 89-13 AMP activities are being effectively implemented to identify and manage aging effects of in-scope heat exchangers, given that the existing GL 89-13 inspections apparently did not identify wall thinning prior to a leak occurring in the heat exchanger. 2. Based on the associated statements in the LRA OpEx example, what changes (i.e., to inform or enhance) were made to the program based on identifying that the leak in the RHR C room cooler that was caused by erosion?

10			Follow up to FAC Question number 7 Question Response says that inspections performed in the raw water systems are performed in accordance with ER-AA-5400-1001, “Raw Water Piping Integrity Management Guide,” Attachment 10, “Extent of Condition.” ER-AA-5400-1001, “Objectives,” states that the guidance supports a strategic approach for monitoring and management of corrosion related failures. Erosion is not specifically mentioned in the guidance except in Attachment 1, Definitions. In addition, Attachment 8, “Corrosion Rate and Remaining Life Evaluation,” uses a safety factor of 1.1. However, the guidance in ER-AA-430-1004, (EPC guidance) says “At no point will a safety factor less than 1.5 be used.”	1. Does ER-AA-5400-1001 appropriately address evaluations for erosion in raw water piping given that the specified safety factor is less than that provide in EPC guidance? 2. Are the room cooler heat exchanger inspections also controlled by the guidance in ER-AA-340-1002, “Service Water Heat Exchanger Inspection Guide”?
11			Follow up to FAC Question number 7 Question Response says, “A work group evaluation was performed, and the recommendation was to verify the availability of spares for each cooler for replacement should any of them fail or be expected to fail prior to the next planned inspection.” If the coolers are expected to fail before the next planned inspection, then it appears that a “run to maintenance” approach is being taken. SRP-LR Section A.1.2.3.4, Detection of Aging Effects states, “A program based solely on detecting component failure should not be considered an effective aging management program for license renewal.”	1. Are the room cooler heat exchanger coils being treated as “run to maintenance,” or are the effects of aging being adequately managed by the Open-Cycle Cooling Water System AMP? 2. How was OpEx from the Dresden HPCI room cooler tube leak (IR 04206210) evaluated as it relates to the Clinton RHR C room cooler leak.

LRA Section: B.2.1.11, Bolting Integrity

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	A.2.1.11 A.5 B.2.1.11	A-15 A-71 B-53	In Application: XI.M18 "Bolting Integrity," Section A.2.1.11, Appendix A.5, Section B.2.1.11 and in Program Basis Document: CL-PBD-AMP-XI.M18, Rev. 2: the applicant identifies the program enhancements in the following AMP Elements: "Scope of Program, (Element 1), "Parameters Monitored or Inspected, (Element 3)," and "Detections of Aging Effects, (Element 4)," as *"Perform shutdown service water (SX) pump inspection with specific instructions to inspect the condition of all closure bolting for evidence of cracking, loss of material, or loss of preload."*	Describe or provide the *"specific instructions,"* and explain how these "specific instructions," are initiated and why they are required (e.g., from OE?).
2	Table3.3.2-9	Page 3.3-150	In LRA Table 3.3.2-12 (Open Cycle Cooling Water System, Page 181), loss of material in carbon and low alloy steel bolting exposed to raw water environment is addressed by the Bolting Integrity AMP, for which generic note H is cited. However, in LRA Table 3.3.2-9 (Fire Protection System, Page 150), loss of material in carbon and low alloy steel bolting exposed to raw water environment is addressed by the Bolting Integrity AMP, for which generic note E is cited.	Clarify whether the same generic note H as in LRA Table 3.3.2-12 should be used for the item in LRA Table 3.3.2-9.

LRA Section AMP B.2.3.13: Closed Treated Water Systems

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.13	B-62	SLRA Section B.2.1.13, states that the Closed Treated Water Systems AMP will be consistent with exceptions and enhancement to the Closed Treated Water Systems AMP specified in NUREG-1801, as modified by LR-ISG-2012-02 and LR-ISG-2013-01. LR-ISG-2013-01, “Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers and Tanks” contains inspection recommendations that can be incorporated into the Closed Treated Water Systems AMP (instead of keeping the inspection recommendations in the Internal Coatings/Linings for In-Scope Piping, Piping Components, Heat Exchangers, and Tanks AMP).	It is unclear to the NRC staff why the applicant referred to LR-ISG-2013-01 in the Closed Treated Water Systems AMP, since it appears that the applicant is not choosing to use the Closed Treated Water Systems AMP to monitor internal coatings.

2	Sections 2.1.4 & B.2.1.13	2.1-17 & B-62 &63	Section 2.1.4 states that the LR-ISG-2012-01 guidance related to wall thinning due to erosion mechanisms is incorporated into B.2.1.10, the CPS Flow-Accelerated Corrosion program. Section B.2.1.13 identified wall thinning due to erosion as a degradation mechanism that needed management in Closed Treated Water Systems. The applicant also stated in Exception 1 that there are no AMR line items that address wall thinning due to erosion in a closed treated water environment in NUREG-1801.	There appears to be conflict between Sections 2.1.4 and B2.1.13 of the application. It is unclear to the NRC staff why the applicant did not reference LR-ISG-2012-01 in Section B.2.1.13 of the application, which addresses Wall Thinning Due to Erosion Mechanisms, and recommends using the GALL AMP XI.M17, "Flow Accelerated Corrosion." LR-ISG-2012-01 also contains new AMR line items that address erosion.

3	3.5.2.2.1.2	3.5-19	In further evaluation in Section 3.5.2.2.1.2, the higher temperature containment penetrations credit both the penetration cooling coils and the stainless-steel reflective metal insulation with ensuring that local concrete temperatures do not exceed a maximum temperature of 200 °F. However, the associated AMR items for the containment and drywell penetration cooler tubes components in Table 3.3.2-1, “Closed Cycle Cooling Water” only cite loss of material with an intended function of leakage boundary and do not cite reduction of heat transfer as an aging effect requiring management. A plant specific note 1 states that the penetration coolers are plate type coolers and therefore have no shell side components. The associated P&ID (LR-CPS-M05-1032, Sht 4) shows these components in red, indicating that these components only serve spatial or structural functions.	If the penetration coolers are being used to maintain local concrete temperatures below 200 °F, discuss why reduction in heat transfer is not an aging effect requiring management.

Clinton Power Station
License Renewal Application (LRA) Breakout Audit Questions

LRA Section: A.2.1.27 and B.2.1.27, Cranes TLAA

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.14	B-67	In Application: XI.M23, Section B.2.1.14, “Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems,” and in Program Basis Document: CL-PBD-AMP-XI.M23, Rev. 2: the applicant identifies the program enhancements in the following AMP Elements: “Scope of Program (Element 1),” “Parameters Monitored/Inspected (Element 3),” and “Detection of Aging Effects (Element 4),” as “…inspection of structural components, rails, and bolting for loss of material due to corrosion; rails for loss of material due to wear; and bolted connections for loss of preload.” However, the enhancement “rails for loss of material due to wear” is listed in Table VII B, “Auxiliary Systems,” Item “VII.BA-07,” on page VII B-2, of NUREG-1801, Rev. 2.	Please clarify why the line item VII.BA-07 was considered as an enhancement.

2	2.3.3.6	2.3-56	In Application: Section 2.3.3.6, “Cranes, Hoists, and Refueling Equipment System,” and in Program Basis Document: CL-PBD-AMP-XI.M23, Rev. 2: the applicant provides the following list of cranes, monorails, and hoists that are in scope for the license renewal: 1- Containment Building Polar Crane, 2- Fuel Building Crane, 3- Fuel Prep Machines, 4- Fuel Handling Platform, 5- Refueling Platform, 6- Auxiliary Platform, 7- CRD Cart Jib Cranes, 8- IFTS Shield Plug Jib Crane, 9- Refueling Platform Jib Crane. However, in Application: Section 4.7.1, “CPS Crane Cyclic Loading Analyses,” and in Program Basis Document: CL-TLAA, Rev. 0, the applicant only considers the following cranes for the TLAA evaluations: 1- Containment Building Polar Crane, 2- Fuel Building Crane. .	Justify why the other cranes, monorails, and hoists that are in scope for license renewal were not considered for the TLAA evaluations.

Clinton Power Station
License Renewal Application (LRA) Breakout Audit Questions

LRA Section /AMP XI.M26, Fire Protection

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	3.3.2.1.9	3.0-6, 3.3-12	LRA Section 3.3.2.1.9 states that fire protection components are exposed to an air - indoor, controlled environment. However, LRA Table 3.3.2-9 does not appear to identify any components that are exposed to an air – indoor, controlled environment. In addition, the staff notes that this environment does not appear to be included as a Clinton AMR environment in LRA Table 3.0-1, nor is it cited for any components in other systems. [Note: LRA Section 3.3.2.1.12 states that Open Cycle Cooling Water System components are exposed to an air – indoor, controlled environment.]	Please discuss whether there are any components in the Fire Protection System that are exposed to an air – indoor, controlled environment.

2	2.3, 2.4, 3.3	2.3-51, 2.3-69, 2.3-72, 2.3-76, 2.4-3, 2.4-13, 2.4-27, 2.4-36, 2.4-41, 3.3-151, 3.3-166	LRA Section 2.3.3.5 states that "Fire damper assemblies are evaluated with the Fire Protection System." LRA Section 2.3.3.9 states, "Additionally, the FPS includes active and passive features such as fire barriers (doors, dampers, fire rated enclosures, fire proofing material, penetration seals, fire barrier function of walls and slabs), ventilation dampers, and deluge systems which retard fires from spreading from one area of the plant to another." In addition, LRA Section 2.3.3.9 states, in part, "The FPS includes…ventilation system dampers…." LRA Table 2.3.3-9 includes component type fire barriers (damper assembly), but it does not include component type ventilation dampers. LRA Sections 2.4.1, 2.4.3, 2.4.6, and 2.4.9 state, "Fire barriers (doors, dampers, fire rated enclosures, fire proofing material, penetration seals, fire barrier function of walls and slabs) and ventilation dampers are evaluated with the Fire Protection System." LRA Section 2.4.8 states, "Ventilation components, such as dampers and ducting, are evaluated with the ventilation systems." LRA Table 3.3.2-9 includes AMR items for galvanized steel and stainless steel fire barriers (damper assembly). However, it does not include AMR items for ventilation dampers.	1. Please clarify the programs that manage the effects of aging of fire dampers. In addition, discuss any necessary changes to the LRA. 2. Please discuss whether Fire Protection program instructions or procedures require enhancement to account for loss of material of the fire damper assemblies.

			Plant-specific note 2 associated with the fire barriers (damper assembly) states, "The Fire Protection AMP is added to supplement the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP in managing the aging effect(s) applicable to this component type, material, and environment combination. The damper housings for dampers with a fire barrier intended function are evaluated with the Fire Protection System and are inspected in accordance with Fire Protection AMP requirements. Fire barrier damper housings located within the in scope boundary of the various ventilation systems also have a pressure boundary intended function and are inspected in accordance with the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components AMP. The pressure boundary intended function is evaluated with the various ventilation systems." However, the LRA does not appear to credit the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program for any fire dampers or ventilation dampers. LRA Table 3.3.2-9 credits the Fire Protection program with managing loss of material of the galvanized and stainless steel fire barriers (damper assembly). Section 8.2.3 of Revision 29a of 9601.01 describes the visual inspection of fire damper assemblies, including that the damper framing is structurally intact and not degrading (loss of material). However, the staff noted the acceptance criteria in Section 9.2.2 do not include the damper framing. In addition, the	

			staff noted that Section 9.2.2 in Revision 28g of 9601.01C002 does not include the damper framing.	
3	2.3, 3.3	2.3-69, 2.3-72, 3.3-150	LRA Section 2.3.3.9 states, "Additionally, the FPS includes active and passive features such as fire barriers (doors, dampers, fire rated enclosures, fire proofing material, penetration seals, fire barrier function of walls and slabs), ventilation dampers, and deluge systems which retard fires from spreading from one area of the plant to another." However, LRA Tables 2.3.3-9 and 3.3.2-9 do not include component type fire rated enclosures.	Please discuss where fire-rated enclosures are addressed in the LRA.

4	Appendix A, Appendix B, 3.3	A-19, A-71, B-75, 3.3-152	LRA Table 3.3.2-9 includes managing change in material properties, cracking/delamination, loss of material, and separation of cementitious fireproofing fire barriers (for steel components). The associated plant-specific note 9 states, “Consistent with operating experience contained in SLR-ISG-2021-02-MECHANICAL (Item VII.G.A-806), Cementitious Fireproofing components in any air environment are susceptible to loss of material, cracking/delamination, change in material properties, and separation. The aging effects for this component, material, and environment combination are managed under the Fire Protection AMP.” Similar plant-specific notes (8 and 12) are included for subliming compound and silicate fire barriers. LRA Section A.2.1.16, Table A.5, and B.2.1.16 include an enhancement to the Fire Protection program that states, “Silicates and subliming compound fire barrier degradation such as change in material properties, cracking and delamination, loss of material, and separation.” It is unclear whether cementitious should also be included in this enhancement. The staff notes that the acceptance criteria for structural steel fireproofing in Revision 0 of 9601.01C011 only addresses cracks and chips.	Please discuss whether the enhancement related to the degradation of silicates and subliming compounds should also include cementitious and which procedures or instructions may need to be updated if it is included.

5	Appendix B	B-74	The Detection of Aging Effects program element in Revision 2 of NUREG-1801, Generic Aging Lessons Learned (GALL) Report,” states, “Visual inspection by fire protection qualified personnel of not less than 10% of each type of seal in walkdowns is performed at a frequency in accordance with an NRC-approved fire protection program (e.g., Technical Requirements Manual, Appendix R program, etc.) or at least once every refueling outage. If any sign of degradation is detected within that sample, the scope of the inspection is expanded to include additional seals.” NUREG-1950, “Disposition of Public Comments and Technical Bases for Changes in the License Renewal Guidance Documents NUREG-1801 and NUREG-1800,” states, “The intent of the GALL frequency is to ensure that 100% of the fire barrier penetration seals are inspected over the 20-year period of extended operation.” LRA Section B.2.1.16 states, “The program requires performance of visual inspections, for penetration seals, of <u>at least 10 percent of each type of accessible fire barrier penetration seal</u> and <u>at least 12.5 percent of each type of inaccessible fire barrier penetration seal</u> at least once per 18 and 24 months, respectively.” The GALL report does not distinguish between accessible or inaccessible fire barrier penetration seals. Revision 0c of 9601.01C009 states the 24-month inspection frequency corelates “with	Please discuss the following: 1. If “at least 12.5 percent of each type of inaccessible fire barrier penetration seal” is part of the NRC-approved Fire Protection program, then provide references showing NRC approval. 2. If it is not a part of the NRC-approved Fire Protection program, then discuss why it was not identified as an exception to the Fire Protection program, given that the GALL report does not distinguish between accessible or inaccessible fire barrier penetration seals. 3. Why there is a discrepancy in the inspection frequency for the inaccessible fire barrier penetration seals in 9601.01 and 9601.01C009. 4. Why there is a discrepancy in the scope expansion criteria for the fire barrier penetration seals in 9601.01 and CL-PBD-AMP-XI.M26, and why 9601.01 appears to only be describing the scope expansion of inaccessible fire barrier penetration seals, and not also the accessible fire barrier penetration seals.

			refueling outages so all inaccessible penetration inspections are completed every 16 years." This appears to meet the intent of the GALL to inspect 100% of the inaccessible fire barrier penetration seals over the 20-year period of extended operation. The staff noted that Revision 29a of 9601.01 states 9601.01C009 is 12.5% Per 12 Month Inaccessible Seal Inspection Checklist, however, Revision 0c of 9601.01C009 is 12.5% Per 24 Month Inaccessible Seal Inspections Checklist. The LRA states 24 months for the inaccessible seal inspections. Section 8.3.6 of Revision 29a of 9601.01 states, "When a failure of a Fire Rated Assembly, credited for in Appendix R, is found during the inspection of the specified 12.5% of a seal type, an additional 10% of the seal type shall be inspected (return to 8.3.1)." Section 8.3.6.1 goes on to state, "This inspection process shall continue until an acceptable 10% sample is found or until 100% of the seals have been inspected during a single performance of this test." However, Section 3.3 of Revision 1 of CL-PBD-AMP-XI.M26 states that the 10% accessible inspection is expanded by 10% and the 12.5% inaccessible inspection is expanded by 12.5%.	

6	3.3	3.3-152	SLR-ISG-2021-02-Mechanical (ML20181A434) added AMR item VII.G.A-807 to Table VII.G in Volume 1 of NUREG-2191 and Table 3.3-1 in NUREG-2192. The aging effects for silicates used as fireproofing/fire barriers exposed to air are loss of material, change in material properties, cracking, delamination, and separation. These aging effects are consistent with Section 6, “Fire Barriers,” of EPRI 3002013084, “Long-Term Operations: Subsequent License Renewal Aging Affects for Structures and Structural Components (Structural Tools),” November 2018. LRA Table 3.3.2-9 identifies cracking as the only aging effect for gypsum fire barriers (for steel components) exposed to indoor uncontrolled air. The staff notes that Section 8.1.1 in Revision 29a of 9601.01 states, “no unsealed holes exist in gypsum board walls.” It is unclear why loss of material, change in material properties, delamination, and separation were not cited as applicable aging effects for gypsum given that it is similar to silicate fireproofing/fire barriers.	Please discuss why loss of material, change in material properties, delamination, and separation were not cited as applicable aging effects for gypsum. In addition, discuss whether Fire Protection program instructions or procedures require enhancement if additional aging effects for gypsum are identified in response to this breakout question.

7	N/A	N/A	The staff noted that some procedures or instructions state, "CPS Fire Marshal/Engineer review of results of each surveillance shall include <u>reviewing against last performance of same surveillance</u> to determine if results indicate a adverse trend due to an rise in failure rates." For example, 9071.09, 9071.09P001, 9071.13, 9071.13P0019071.14, 9071.14P001, 9601.01, 9601.01C011, 9601.01C010, 9601.01C009, 9601.01C006, 9601.01C005, 9601.01C003, 9601.01C002, and 9601.01C001. Some procedures do not include a similar statement or any statements regarding trending. For example, 3822.05, 9071.25, 9071.25C001, 9476.03, 9601.05, 9601.05C001, 9601.06, 9601.06C001, 9601.13, and 9601.13C001.	1. Please discuss whether comparing results against the last performance could limit the ability to identify negative trends slowly occurring over time. 2. Please discuss whether statements related to trending should be added to any additional procedures or instructions.
8	N/A	N/A	AR04551278 discusses decreasing the frequency of "false alarms." It is unclear what the "false alarm" issues were and what actions were taken to decrease the frequency of "false alarms."	Please discuss what "false alarms" were being reported and what actions were taken to decrease the frequency of "false alarms."

<u>LRA Section: B.2.1.17, Fire Water System</u>

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	2.3.3.9, 3.3	2.3-72, 3.3-150	LRA Tables 2.3.3.9 and 3.3.2-9 do not include components associated with the diesel-driven fire pump engine (i.e., heat exchanger channel, shell, tube, and jacket water). Table 2.3-2 in Revision 2 of NUREG-1800 states that "Diesel engine jacket water heat exchanger and portions of the diesel fuel oil system and starting air system supplied by a vendor on a diesel generator skid" are "passive, long-lived components having intended functions. They are subject to an AMR for license renewal even though the diesel generator is considered active." The staff notes that LRA Section 2.1.6.1 states, "Some mechanical components, when combined, are considered a complex assembly. A complex assembly is a predominantly active assembly where the performance of its components is closely linked to that of the intended function of the entire assembly, such that testing and monitoring of the assembly is sufficient to identify degradation of these components. An example of a complex assembly are diesel generators. Complex assemblies are considered active and can be excluded from the requirements of AMR." P&ID LR-CPS-M05-1039 states that the internal cooling water loop, air intake and associate	Please address the following: 1. Why LRA Tables 2.3.3.9 and 3.3.2-9 do not include any components associated with the diesel-driven fire pump engine. 2. Describe the configuration of the diesel-driven fire pump (e.g., are components internal to the engine or physically mounted on the engine). 3. Was the leak in IRIS 311563 due to internal or external corrosion? 4. Does the diesel-driven fire pump engines also have issues with microbiological activity? 5. Discuss whether there has been any additional operating experience associated with any components associated with the diesel-driven fire pump engine (e.g., coolant leaks, tube bundle replacement, fouling, etc.), including what caused the degradation. 6. Identify and describe periodic maintenance procedures/activities related to the diesel-driven fire pump, including whether periodic chemistry testing is performed.

			tubing/instruments, and cooling coil are integral parts of the complex diesel engine assembly and therefore are not subject to license renewal AMR. Table 2.3-2 in Revision 2 of NUREG-1800 states that "Diesel engine jacket water heat exchanger and portions of the diesel fuel oil system and starting air system supplied by a vendor on a diesel generator skid" are "passive, long-lived components having intended functions. They are subject to an AMR for license renewal even though the diesel generator is considered active." IRIS 311563 dated February 2014, states, "The cause of the leak was a pin hole on the water manifold. The leak was located on the bottom side of a spool piece and was attributed to corrosion," and "The leak, if unchecked would have caused a failure of the diesel driven fire pump to start, run, and deliver adequate flow due to engine overheating. (IR1624636)." This appears to be operating experience indicating that the effects of aging need be managed on the diesel driven fire pump cooling water systems. The staff notes that the Closed Cooling Water Treatment Control procedure notes past microbiological activity has been reported in the diesel generator jacket cooling water system. [Note: Scoping and screening also has a question regarding the passive components	

			associated with the diesel-driven fire pump engine]	
2	3.3, Appendix B	3.3-162	Table 4a in Appendix L of LR-ISG-2012-02 recommends that the inspection and testing of fire pump suction screens follow NFPA 25 Section 8.3.3.7, which states the suction screens be "inspected and cleared of any debris or obstructions" following the "waterflow portions of the annual test or fire protection system activations." LRA Table 3.3.2-9 cites AMR item 3.3.1-64 for managing flow blockage and loss of material of the copper alloy with 15% zinc or less strainer (element) exposed internally to raw water Revision 1 of CL-PBD-AMP-XI.M27 states that the fire pump suction strainer is inspected every five years for corrosion, damage, or lost parts during the intake structure inspections. The staff notes that Revision 9 of 2400.01 states that the fire pumps are inspected for missing bolts on the pump bells; corrosion on the pump housing; and damage, holes, or obstructions of the suction screens. Performing inspections and testing of the fire pump suction screens every five years instead of following the waterflow portions of the annual test or fire protection system activations appears to be an exception to the recommended inspection and testing of the fire pump suction screens in Table 4a in Appendix L of LR-ISG-2012-02. However, LRA Section B.2.1.17 does not include an exception related to the fire pump suction screens.	Please discuss the following: 1. Please discuss whether the LRA should include an exception related to the fire pump suction screens, including how both loss of material and flow blockage will be managed for the fire pump suction screens. 2. Identify any operating experience related to flow blockage and loss of material of the fire pump suction screens. 3. Identify the procedure(s) related to routinely inspecting the traveling screens, including the frequency of the procedure(s). 4. Whether traveling water screen low differential pressure conditions are also monitored and alarmed in the main control room. 5. If low differential pressure conditions are not monitored and alarmed, discuss how the Open-cycle Water System will ensure larger size debris doesn't pass through which could reach the fire pump suction screen.

			LRA Table 3.3.2-12 credits the Open-Cycle Water System with managing loss of material of the galvanized steel traveling water screens exposed externally to raw water. Section 3.4 in Revision 1 of CL-PBD-AMP-XI.M27 states, "The traveling water screens are also inspected routinely by plant operators for evidence of degradation." Section 3.4 in Revision 1 of CL-PBD-AMP-XI.M27 also states, "Abnormal operation or restricted flow (high differential pressure) conditions are alarmed in the main control room and operations personnel are dispatched to take corrective action." The staff notes that low differential pressure could be an indication that either the debris loading is low or that the traveling screens are degraded and allowing larger size debris to pass through, which could result in debris or obstructions reaching the fire pump suction screen.	
3	3.3	3.3-154	LRA Table 3.3.2-9 credits the External Surfaces Monitoring of Mechanical Components program and the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components for managing loss of material of carbon steel flame arrestors exposed externally to outdoor air and internally to condensation, respectively.	Please discuss whether the carbon steel flame arrestors could become blocked, and therefore, blockage would be an applicable aging effect.
4	3.3	3.3-61, 3.3-187	AMR item 3.3.1-66 in Table 3.3-1 of LR-ISG-2012-02 manages loss of material due to pitting and crevice corrosion, fouling that leads to corrosion, and flow blockage due to fouling of	Please discuss how the Open-Cycle Cooling Water System program is sufficient to manage flow blockage and loss of material of the stainless steel manual deluge spray nozzles (i.e.,

			stainless steel piping, piping components, and piping elements exposed to raw water by the Fire Water System program. The Discussion of AMR item 3.3.1-66 in LRA Table 3.3.1 states, "The Open-Cycle Cooling Water System (B.2.1.12) program has been substituted and will be used to manage flow blockage of stainless steel piping components in the Open Cycle Cooling Water System." LRA Table 3.3.2-12 cites AMR item 3.3.1-66, with Notes E, 3, for managing flow blockage of the stainless steel spray nozzles exposed internally to raw water. Plant-specific note 3 states, "Flow blockage of manual deluge spray nozzles within the Open-Cycle Cooling Water System are managed by the Open-Cycle Cooling Water System AMP in place of the Fire Water System AMP." In addition, LRA Table 3.3.2-12 cites AMR item 3.3.1-40 for managing loss of material of the stainless steel spray nozzles exposed internally to raw water. In accordance with NFPA 24 Section 10.3.4.3, Table 4a in Appendix L of LR-ISG-2012-02 recommends that water spray fixed systems, on a refueling outage basis, have an operational test to observe open spray nozzle discharge patterns to ensure correct nozzle position and that there are no obstructions. There appears to be a lack of information regarding using the Open-Cycle Cooling Water System program in lieu of the Fire Water System program to manage flow blockage and	are the inspections/tests, frequency of inspections/tests, acceptance criteria, and corrective actions equivalent to or better than those that would be performed as part of the Fire Water System program). In addition, please identify the Open-Cycle Cooling Water System program procedures associated with managing flow blockage and loss of material of the manual deluge spray nozzles.

			loss of material of the manual deluge spray nozzles available in the LRA and on the portal.	
5	3.3	3.3-154	AMR item 3.3.1-89 in Table 3.3-1 of LR-ISG-2012-02 manages loss of material of steel and copper alloy piping, piping components, and piping elements exposed internally to moist air or condensation by: "<u>For fire water system components: Chapter XI.M27, 'Fire Water System,'</u> or for other components: Chapter XI.M38, 'Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components.'" LRA Table 3.3.2-9 cites AMR item 3.3.1-89, with Note A, for managing loss of material of the following components exposed internally to condensation by the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components: • carbon steel flame arrestors; • carbon steel, copper alloy with greater than 15% zinc, ductile cast iron piping and piping components; and • carbon steel valve bodies. Note A is defined as "Consistent with NUREG-1801 item for component, material, environment, and aging effect. AMP is consistent with NUREG-1801 AMP." However, given that these components are in the Fire Protection system, Note E, "Consistent with NUREG-1801 item for material, environment and aging effect, but a different aging management program is credited or NUREG-1801 identifies a plant-specific aging	Please address the following: 1. The use of Note A for the components noted in the question. 2. How the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program is sufficient to manage loss of material of the components noted in the question (i.e., are the inspections/tests, frequency of inspections/tests, acceptance criteria, and corrective actions equivalent to or better than those that would be performed as part of the Fire Water System program). In addition, please identify the Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components program procedures associated with managing loss of material of the components noted in the question.

			management program," appears to be appropriate.	
6	Appendix A, Appendix B	A-19, A-21, A-75, B-78, B-83	LRA Section A.2.1.17 states, "Testing or replacement of sprinklers that have been in place for 50 years is performed using the guidance of NFPA 25, 2011 Edition." LRA Section B.2.1.17 states, "The Fire Water system program <u>includes replacement or testing</u> of a representative sample of sprinklers before they reach 50 years of service. Fifty-year sprinkler head testing will be conducted using the guidance provided in NFPA 25, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems." Enhancement 9 in LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5 states, "Prior to 50 years of service and every 10 years after, <u>remove a representative sample of sprinklers and submit for testing</u> to a recognized laboratory." It is unclear why the enhancement does not address replacement. NFPA 25 Section 5.3.1 includes sprinkler testing requirements for standard sprinklers, fast-response sprinklers, solder-type sprinklers, and dry sprinklers. Revision 1 of CL-PBD-AMP-XI.M27 states, "Fast response sprinkler elements are not utilized. Solder type sprinklers with a temperature classification of extra high (325F) or greater are not utilized."	Please discuss the following: 1. Should Enhancement 9 in LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5 also refer to replacement of sprinklers? 2. Please discuss whether the replacement/testing frequency for dry sprinklers (NFPA 25 Section 5.3.1.1.1.6) should be included in LRA Sections A.2.1.17 and B.2.1.17 and in Enhancement 9 in LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5.
7	Appendix B	B-79	LRA Section B.2.1.17 states, "Flow testing results are reviewed and trended to identify degrading trends prior to loss of system function."	Please discuss whether the results of visual inspections, flushes, and wall thickness measurements will also be trended.

			The staff recognizes that the Monitoring and Trending program element in Appendix L of LR-ISG-2012-02 states, “Results of flow testing (e.g., buried and underground piping, fire mains, sprinkler) are monitored and trended.” However, the Monitoring and Trending program element in Revision 2 of NUREG-2191 states, “Results of flow testing (e.g., buried and underground piping, fire mains, and sprinkler), flushes, and wall thickness measurements are monitored and trended.” The staff did note that Revision 9 of CC-AA-211 states, in part, that the Site Fire Protection Strategic Engineer “Review for analysis and trending station documented Fire Protection program testing and inspection activity results…” Given that the LRA and Revision 1 of CL-PBD-AMP-XI.M27 do not appear to discuss trending of the results of visual inspections, flushes, and wall thickness measurements, it is unclear whether the statement in Revision 9 of CC-AA-211 is referring to all testing and inspection results or just flow testing.	
8	Appendix B	B-84	The third sentence in the last paragraph of the Operating Experience discussion in LRA Section B.2.1.17 appears to be incomplete. The sentence states, “The inspection methods being implemented by the program have been proven effective in detecting aging effects including identified.”	Please discuss whether the third sentence in the last paragraph of the Operating Experience discussion in LRA Section B.2.1.17 should be revised.
9	Appendix B	B-78	LRA Section B.2.1.17 states, “The CPS design does not include water-based fire protection	Given the statement in Revision 1 of CL-PBD-AMP-XI.M27, please confirm the staff’s

			systems that are normally dry but periodically subject to flow and cannot be drained. Therefore, augmented testing in addition to that specified in NFPA 25 is not required." However, Section 2.1 of Revision 1 of CL-PBD-AMP-XI.M27 states, in part, "the program will be enhanced to perform augmented internal and external inspections of sprinkler systems for material that could cause flow blockage for portions of the water-based fire protection system that are (a) normally dry but periodically subject to water flow and (b) that cannot be drained or allow water to collect, to prevent collection of water." The staff notes that LRA Section B.2.1.17 states, "Engineering walkdowns were performed to verify proper draining of dry preaction sprinkler systems and deluge systems." The Detection of Aging Effects program element in Appendix L of LR-ISG-2012-02 includes the augmented inspections recommended for normally dry but periodically wetted portions of the Fire Protection system.	understanding that the Fire Water System program is not being enhanced to perform augmented inspections for the normally dry but periodically wetted portions of the Fire Protection system.
10	Appendix A, Appendix B	A-20, A-73, B-81	Sections 3.4 of Revision 1 of CL-PBD-AMP-XI.M27 (Pages 27 and 37-38 of 84) states, "The underground fire water piping is of the same material as the above ground piping and the program will be <u>enhanced to perform internal inspections of pipe</u>." However, LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5 does not appear to include an enhancement related to internal inspections of above ground piping. The staff	Please discuss whether the intent is to have an enhancement to the Fire Water System program related to performing internal inspections of above ground piping.

			notes that Enhancement 2 in LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5 is related to external visual inspections of above ground fire main supply piping.	
11	Appendix A, Appendix B	A-20, A-73, B-81	Enhancement 5 in LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5 states, "Utilize the corrective action program to determine an increased test frequency when established test criteria are not met or when significant degraded trends that could adversely affect system intended function are identified during the underground fire main flow test. When test results pass the established test criteria, the test frequency may be extended to a five-year frequency in accordance with NFPA 25 and allowed by NEIL and site specific procedures."	Please address the following: 1. Is increasing the test frequency to five years in Enhancement 5 limited to the underground fire main flow tests? 2. Are the underground fire main flow tests performed on a 2-year frequency (Revision 13a of 1893.06)? If the current frequency is more frequent than that allowed by NFPA 25 and NEIL, what is currently driving the more frequent tests? 3. Provide more details on the criteria used to determine the test frequency may be extended to five years (e.g., how many test results are considered?).
12	Appendix A, Appendix B	A-20, A-73, B-81	Section 3.3 of Revision 1 of CL-PBD-AMP-XI.M27 (Page 16 of 84) states, "The program will be enhanced to perform air flow tests every refuel outage to ensure there are no piping or nozzle blockages." Revision 27d of 9071.12 refers to 1896.06 for the frequency. Revision 13a of 1893.06 states the frequency of the air flow test is 3 years. Staff did not see a markup related to this frequency. Enhancement 3.c in LRA Sections A.2.1.17 and B.2.1.17 and in LRA Table A.5 states, "Deluge systems - perform an external visual inspection on a refueling outage frequency of the accessible piping and spray spargers inside the filter plenums to assure they are in their proper	Please discuss whether the air flow tests will be performed on a refueling outage frequency or a 3-year frequency. In addition, discuss any necessary changes to Enhancement 3.c related to the frequency of the air flow tests.

			position and spray patterns are not obstructed. <u>This will be in addition to the air-flow tests that are currently performed</u> to ensure there is no flow blockage. In addition, the program will be enhanced to include internal visual inspections of piping around the flanged spool piece during air-flow testing." The staff notes that stating the external visual inspections will be in addition to the currently performed air-flow tests does not necessarily mean they are performed on the same frequency. It could simply mean it is an additional test performed on the deluge systems.	
13	Appendix B	B-78	LRA Section B.2.1.17 states, "By review of site-specific operating experience (OE), recurring internal corrosion is not occurring in the fire water system." Section 3.3 of Revision 1 of CL-PBD-AMP-XI.M27 (Page 13 of 84) states, "A review of CPS operating experience revealed individual <u>instances of internal corrosion</u> in the fire water system piping that is within the scope of the Fire Water System aging management program. Recurring internal corrosion was not identified."	Please address the following: 1. Provide a list of the CRs associated with the individual instances of internal corrosion in the fire water system piping. 2. Provide sufficient information supporting the determination that the individual instances of internal corrosion in the fire water system piping does not meet the recurring internal corrosion applicability criteria in LR-ISG-2012-02 (two occurrences for 5-year OE search and three occurrences for 10-year OE search).
14	Appendix B	B-79	LRA Section B.2.1.17 includes an exception to the recommendation to perform main drain tests in accordance with NFPA Section 13.2.5 in Table 4a of LR-ISG-2012-02. LRA Section B.2.1.17 states, "The current Clinton Fire Protection program does not perform main drain tests."	Please address the following: 1. Please fully describe potential hazardous and unique challenges associated with performing main drain testing. 2. Does the NEIL LCM require specific tests and inspections in lieu of the main drain tests. If so, what are they?

			NFPA Section 13.2.5 states that "main drain tests shall be conducted annually at each water-based fire protection system riser to determine whether there has been a change in the condition of the water supply piping and control valves." LRA Section B.2.1.17 states, "The NEIL LCM, written specifically for the highly regulated nuclear industry, identifies the potential hazardous and unique challenges associated with performing main drain testing of nuclear power plant fire suppression systems and includes an allowance to omit main drain testing. The NEIL LCM, written specifically for the highly regulated nuclear industry, identifies the potential hazardous and unique challenges associated with performing main drain testing of nuclear power plant fire suppression systems and includes an allowance to omit main drain testing. The allowance requires the performance of various other tests and inspection (e.g. valve position verification and cycling, flow tests, flushes, and suppression system inspection) which, in place of the main drain test, ensures that no major obstructions exist in the fire suppression system piping." It is unclear what the potential hazardous and unique challenges associated with performing main drain testing are and what the various other tests and inspections the NEIL LCM requires in lieu of the main drain tests. The staff notes that Revision 1 of CL-PBD-AMP-XI.M27 states, "Per the LCM, an accurate reading of flow through a 2" main drain could	3. Please discuss all activities that would be performed in lieu of main drain tests and how the activities would provide an equivalent level of information. In addition, please identify the procedure(s) and frequencies associated with the activities that would be performed in lieu of main drain tests. 4. Please discuss whether LRA Section B.2.1.17 should include an exception related to not performing flushes of the dry preaction systems. 5. If an exception is needed, then please provide a technical justification that includes a discussion of the activities that would be performed in lieu of flushing dry preaction systems and how the activities would provide an equivalent level of information. In addition, please identify the procedure(s) and frequencies associated with the activities that would be performed in lieu of flushing dry action systems. 6. Please discuss whether there has been any operating experience related to the dry preaction systems.

			require the discharge of thousands of gallons to stabilize flow prior to taking a residual pressure reading." LRA Section B.2.1.17 states, "While main drain testing is not an effective method to detect age-related flow blockage, the NRC approved CPS Fire Protection Program includes <u>full flow testing of the system supply headers</u> which would adequately identify partial restrictions of supply piping and increased hydraulic resistance of the system. The results of the systemwide flow testing are trended and compared to the system hydraulic analysis to ensure that adequate flow is available to fire suppression systems." However, Revision 1 of CL-PBD-AMP-XI.M27 appears to discuss additional tests and inspections related to the main drain tests exception. Several procedures and PMIDs were cited (Page 27 of 84). Therefore, the extent of activities in lieu of the main drain tests is unclear based on the language in LRA Section B.2.1.17. Section 3.3 of Revision 1 of CL-PBD-AMP-XI.M27 (Page 15 of 84) states, "<u>Flushes</u> and main drain tests will not be performed on the dry preaction systems." LRA Section B.2.1.17 does not appear to include an exception related to not performing flushes of the dry preaction systems.	

LRA Section B.2.1.22: Selective Leaching

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	N/A	N/A	LR-AA-1609, "Aging Management Reviews (AMR)," Revision 1 has the following keywords related to selective leaching: "de%alloy", "de%alum", and "de%graph".	The staff requests a discussion on the following: (a) how the use of the symbol "%" impacts the keyword search results; (b) if the keyword search that was performed would return results for "dealloy", "graphitic", "graphitization", and "graphitisation"; and (c) why "de%zinc" was not included as a search term.
2	N/A	N/A	Section 3.4 of CL-AMPBD-SLR, "Selective Leaching Inspection Sample Basis Document," Revision 0, discusses performing metallurgical analysis of components in place of visual examinations. It also notes that the sample size can be reduced by a factor of three (i.e., 6.7 percent or a maximum of 9 components) if the entire material and environment population is evaluated using metallurgical analysis in lieu of visual examinations.	The staff requests a discussion with respect to why the LRA does not include an exception related to reducing sample size if metallurgical analyses are performed. This sample size reduction is not included in GALL-LR Report (Revision 2) AMP XI.M33, "Selective Leaching."

3	B.2.1.22	B-103	CL-AMPBD-SLR includes a discussion on three inspection populations: copper alloy/ water (Attachment 3A); ductile and gray cast iron/ water (Attachment 3B); and ductile and gray cast iron/ soil (Attachment 3C). Exception No. 1 to LRA Section B.2.1.22, "Selective Leaching," states "[t]he gray and ductile cast iron population includes components in treated water environments, e.g., closed cycle cooling water, and untreated water environments, e.g., raw water. The inspection locations are a representative sample of the system population and focuses on the bounding or lead components most susceptible to aging due to severity of operating conditions, i.e., the sample population only includes locations in raw water and waste water environments."	The staff requests a discussion on the following: (a) why all water environments (i.e., closed-cycle cooling water, treated water, raw water, and waste water) are being combined into one environment; and (b) why ductile iron and gray cast iron are being treated as one material.
4	B.2.1.22	B-103	Exception No. 1 to LRA Section B.2.1.22 states "[d]ue to a limited total population of gray and ductile cast iron components in raw water and waste water, a sample population of 15 provides reasonable assurance selective leaching can be detected prior to entering the period of operation." The staff reviewed CL-AMPBD-SLR (Attachment 3B) and noted (a) there are many gray and ductile cast iron components in raw water and waste water; and (b) many gray and ductile cast iron components in raw water and waste water have "Note 1" which indicated a sample of at least 25 components.	The staff requests a discussion on the following: (a) the total population (components or amount of piping in linear feet) of gray and ductile cast iron components in raw water and waste water; and (b) why the language in the exception discusses the total population for raw water and waste water environments, even though the exception appears to be applicable to all water environments (i.e., closed-cycle cooling water, treated water, raw water, and waste water).

5	N/A	N/A	CL-AMPBD-SLR includes a discussion of malleable iron fittings exposed to waste water in the plant drainage system. Draft NUREG-2221, Revision 0, Supplement 1, “Technical Bases for Changes in the Subsequent License Renewal Guidance Documents, Draft NUREG–2191, Revision 1, and Draft NUREG–2192, Revision 1, Draft Report for Comment,” documents recent SLRA plant-specific operating experience (OE) as a basis for the inclusion of malleable iron as a material susceptible to selective leaching.	The staff requests a discussion with respect to how (or if) in-scope malleable iron components exposed to environments where selective leaching could occur will be managed for loss of material due to selective leaching.
6	B.2.1.22	B-104	Based on its review of plant-specific OE provided by the applicant on the ePortal, the staff noted instances of through-wall leakage and significant external corrosion of buried ductile iron potable water system piping. The staff also reviewed the laboratory analysis associated with this OE, which confirmed the presence of graphitization corrosion (i.e., selective leaching). The OE discussion in LRA Section B.2.1.22 states “the failure analysis database of the Constellation Power Labs (the research facility which performs detailed failure and metallurgical analyses for Constellation nuclear facilities) was researched to determine if selective leaching has been identified for components at Clinton. No occurrences of selective leaching were identified in an extensive search of Clinton historical information and operating experience.”	The subject OE involved out-of-scope piping; however, the staff requests a discussion with respect to how (or if) this OE was considered during the development of the Selective Leaching program at Clinton Power Station.

LRA Section B.2.1.28: Buried and Underground Piping and Tanks

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	N/A	N/A	*CPS InTellusAS™ 2021 Annual Survey Report* has several overprotected areas as high as -6.950 volts (V) instant-off relative to a copper/copper sulfate reference electrode (CSE). *CPS InTellusAS™ 2022 Annual Survey Report* has some overprotected areas, but only as high as -1.783 V instant-off relative to a CSE. GALL-LR Report AMP XI.M41, "Buried and Underground Piping and Tanks," as modified by LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," states to prevent damage to the coating, the limiting critical potential should not be more negative than -1.200 V.	Based on its review of the 2021 annual survey report, the staff requests a discussion on the potential for coating damage to overprotected areas.
2	N/A	N/A	CL-PBD-AMP-XI.M41, "Program Basis Document, Buried and Underground Piping and Tanks, GALL Program XI.M41 - Buried and Underground Piping and Tanks," notes the following: • During normal operation, the jockey pump cycles every 2-3 hours for 45 seconds. • If the jockey pump is incapable of maintaining header pressure, then the diesel driven fire pumps will start. • Failure of the jockey pump will result in an alarm.	The staff requests a discussion on the following: 1. What is the leakage rate (approximate) during normal operation? 2. What is the capacity of the jockey pump (gpm)? 3. What defines failure of the jockey pump? 4. Will only the alarms be monitored? Or will more frequent cycles (i.e., less than 2 hours) or longer run times (i.e., greater than 45 seconds) be monitored?

3	B.2.1.28	B-124	Enhancement No. 1 to LRA Section B.2.1.28, “Buried and Underground Piping and Tanks,” does not include the following from GALL Report AMP XI.M41 (as modified by LR-ISG-2015-01): “[t]hese additional inspections conducted during the four years following the end of an inspection interval cannot also be credited towards the number of inspections in Table XI.M41-2 for the following 10 year interval.”	The staff requests a discussion on why the following language is not included in the enhancement.
4	B.2.1.28	B-124	Enhancement No. 1 to LRA Section B.2.1.28 states “[e]xpansion of sample size may be limited by the extent of piping subject to the observed degradation mechanism or if the piping system or portion of the system is replaced ***or otherwise mitigated*** [emphasis added by staff] within the same 10-year inspection interval in which the original degradation was identified or within four years after the end of the 10-year interval, if the degradation was identified in the latter half of the 10-year interval.”	The statement “or otherwise mitigated” is not included in GALL Report AMP XI.M41, as modified by LR-ISG-2015-01. The staff requests a discussion on why the following language is included in the enhancement.
5	N/A	N/A	GALL Report AMP XI.M41 (as modified by LR-ISG-2015-01) states “[w]hen using the option of monitoring the activity of a jockey pump instead of inspecting buried fire water system piping, ***a flow test or system leak rate test is conducted by the end of the next refueling outage*** [emphasis added by staff] or as directed by the current licensing basis, whichever is shorter, when unexplained changes in jockey pump activity (or equivalent equipment or parameter) are observed.”	The recommendation that “a flow test or system leak rate test is conducted by the end of the next refueling outage” does not appear to be included in the LRA or the program basis document (CL-PBD-AMP-XI.M41). The staff requests a discussion on this topic.

6	Table 3.3.2-12 Table 3.3.1	3.3-183 3.3-77	LRA Table 3.3.2-12 states carbon steel piping and piping components exposed to concrete have no aging effects requiring management. The AMR line item is linked to NUREG-1800 Table 1 Item 3.3.1-106. LRA Table 3.3.1 (item 3.3.1-106) states steel (with coating or wrapping) piping, piping components, and piping elements exposed to soil or concrete will be managed for loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion (MIC) using the Buried and Underground Piping and Tanks program.	The staff requests a discussion with respect to the apparent disconnect between LRA Table 3.3.2-12 (which cites no aging effects) and LRA Table 3.3.1 (which cites loss of material as an applicable aging effect).
7	B.2.1.28	B-125	Operating experience (OE) example No. 2 in LRA Section B.2.1.28 describes a 2014 ultrasonic inspection performed on the 30-inch “A” shutdown service water line. The results showed wall thickness readings that were lower than surrounding readings.	The staff requests a discussion with respect to the following: 1. What was the external environment for this piping (e.g., aboveground, underground, soil, concrete)? 2. Was the reduced wall thickness due to internal corrosion, external corrosion, or a combination of both?

8	B.2.1.28	B-123	Exception No. 1 to LRA Section B.2.1.28 states "[b]ased on the original design specification and drawings, the aggregate size for Clinton allows for material which is larger than the one inch specified in ASTM D 448-08 Size 67. The specification allows for an aggregate size of no larger than three inches; however, any aggregate near ***safety related*** [emphasis added by staff] pipe is listed with a maximum size of 1-1/2 inches." K-2942, "Earthwork Clinton Power Station – Units 1 and 2 – Illinois Power Company," Amendment 10, indicates that the maximum backfill size around welded steel piping is 1.5-inches.	The staff requests a discussion with respect to whether the maximum backfill size around in-scope non-safety related buried piping would be 3-inches, 1.5-inches, or some other value.

9	B.2.1.28	B-122	Based on its review of plant-specific OE provided by the applicant on the ePortal, the staff noted instances of through-wall leakage and significant external corrosion of buried ductile iron potable water system piping. The laboratory analysis associated with this OE noted that the external deposits identified sulfides and acidic conditions, which the laboratory analysis noted is normally associated with MIC from sulfate reducing bacteria (SRB). LRA Section B.2.1.28 states "[t]he program uses the -850 mV [millivolts] relative to copper/copper sulfate reference electrode (CSE), instant off criterion…" GALL-LR Report AMP XI.M41, as modified by LR-ISG-2015-01, states for steel piping, when active MIC has been identified or is probable, a polarized potential of -950 mV or more negative is recommended.	The subject OE (contained in a large document) was provided based on the staff's request for in-scope or out-of-scope buried piping inspection results. The staff requests a discussion on where inspection results specifically related to in-scope buried steel piping (either external visual inspections or internal volumetric inspections) can be reviewed on the ePortal. Providing specific documents and page numbers would be helpful. The subject OE involved out-of-scope piping; however, the staff requests a discussion on whether this OE is relevant to in-scope piping (i.e., whether they involve similar materials and coating systems and are buried in a similar soil environment). Based on its review of the subject OE, the staff requests a discussion on whether -850 mV or -950 mV is a more appropriate cathodic protection acceptance criterion at Clinton Power Station.

<u>LRA Sections A.2.1.29 and B.2.1.29 AMP: ASME Section XI, Subsection IWE</u>

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.29 & Program Basis Document (PBD) Section 3.3-CPS-(b)	B-127 thru B-129 & PBD p16 of 45	<u>*Consistency of "parameters monitored or inspected" element*</u>: The LRA describes the B.2.1.29 AMP, with one enhancement, will be consistent with the program elements of GALL-LR AMP XI.S1. PBD program element 3 description for non-coated surfaces does not include "arc strikes" as a parameter monitored which is included in the corresponding program element of GALL-LR AMP XI.S1; therefore, this program element appears to be inconsistent with GALL-LR in this regard.	a) Explain why "arc strikes" is not required to be a "parameter monitored or inspected" for the LRA AMP in a manner that demonstrates the claim of consistency with the "parameters monitored or inspected' program element of the GALL-LR AMP XI.S1. b) Update the LRA as necessary consistent with response to the above

<u>SLRA Section: B.2.1.31 /A.2.1.31 ASME Section XI, Subsection IWF AMP & SLRA Table 3.5.1</u>

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.31; A.2.1.31; Table A.5 Item 31.2	B-136; A-31; A-80	<u>*Consistency of "monitoring and trending" element*</u>: LRA includes Enhancement 2 to program element 5, which states: *"Provide guidance, regarding the selection of supports to be examined in subsequent inspection intervals, when a support that is acceptable for continued service as defined in IWF-3400, is restored in*	a) Provide a revised enhancement statement that provides clarity to its intent and reference to the appropriate IWF provision(s) that would trigger action related to the enhancement. b) Provide conforming updates of the enhancement in other applicable LRA

			accordance with the corrective action program. The enhanced guidance will ensure that the sample is increased to include another support, of the same type and function, that has not been restored to correct the observed condition." The staff notes that IWF-3410 provides a list of component support conditions that are unacceptable for continued service. Therefore, absence of those conditions would indicate acceptability for continued service, which is not a definition as claimed and would not result in any restoration. Further, the enhancement does not state restored to what condition (e.g., original design condition, repaired to as-new). The enhancement also does not state the purpose of increasing the sample for subsequent intervals (e.g., to assure continued sample representativeness of population when a component support is acceptable for service without correct measures but is restored to original design condition. Therefore, there is a lack of clarity in the language of the enhancement as written and it does not refer to the appropriate IWF provisions.	sections (e.g., USAR supplement and LRA Commitments table).
2	A.2.1.31	A-31	The USAR supplement states, in part: *"The program is implemented through procedures, in accordance with the requirements of ASME Section XI, Subsection IWF, 2013 Edition, as approved in 10 CFR 50.55a."* • Contrary to a specific code edition (2013) in the above USAR supplement statement, 10	a) Provide a revised USAR supplement statement reflecting the requirement for code edition used during the PEO consistent with 10 CFR 50.55a(g)(4) for applicable ISI code edition for subsequent inspection intervals.

			CFR 50.55a requires the inspection interval code edition to be consistent with the code edition(s) for subsequent ISI interval during the PEO in accordance with 10 CFR 50.55a(g)(4), and therefore this aspect of the USAR supplement description appears inadequate.	
3	B.2.1.31; PBD 3.1-CPS	B-135; PBD p9	AMP XI.S3 Components Not Used at CPS: CPS "Scope of Program" element in PBD states: *"CPS currently does not use elastomeric vibration isolation elements for ASME Code components; however procedures require that if vibration isolation elements are used in the future, to verify that the elastomeric vibration isolation elements are acceptable by having no loss of material, cracking, or hardening that can lead to loss of isolation function. (Reference: ER-AA-450, Attachment 2, Section 4.e)."* The staff needs the above information on the docket to make its determination of AMP consistency with the GALL AMP XI.S3, as applicable to CPS.	a) Update LRA Section B.2.1.31 to include the information cited in the Background/Issue column of this question. b) Provide the cited reference ER-AA-450 (with Attachment 2) in the ERR.
4	B.2.1.31; PBD 3.2-CPS	B-135; PBD p1	AMP XI.S3 Components Not Used at CPS: CPS "Preventive Actions" element in PBD states: *"Structural bolting, including ASME SA-540, ASTM A325, and A490 bolting, is generally received with a light residual coating of oil and installed without lubricant. Additional thread lubricant is typically used on mechanical joints*	a) Update LRA Section B.2.1.31 to include the information cited in the Background/Issue column of this question. Also, confirm high-strength bolting (as defined in GALL) in sizes greater than 1-inch nominal diameter will not be used in IWF supports in the future during the PEO.

			such a pipe flanges, however, additional thread lubricant is not used for IWF support structural bolting. (References: ER-AA-335-016, Section 4.1.2; CC-AA-102, Section 4.1.13). CPS "preventive actions," "parameters monitored or inspected," and "detection of aging effects" program elements in PBD states: *"High strength bolting (actual measured yield strength greater than or equal to 150 ksi or 1034 MPa) in sizes greater than one-inch nominal diameter is not used [or is restricted from use] in CPS IWF supports. Plant-specific operating experience has not identified cracking or SCC for high strength bolts used in IWF supports at CPS. (Reference: CC-AA-102, Section 4.1.13"* The "preventive actions" program element of GALL AMP XI.S3 states that molybdenum disulfide (MoS2) and other lubricants containing sulfur should not be used since it is a potential contribution to SCC. The staff needs the above information and additional confirmation to make its determination of AMP consistency with the GALL AMP XI.S3, as applicable to CPS.	b) Confirm and state in the LRA that additional thread lubricant, especially those containing MoS2 or other lubricants containing sulfur, have not been and will also not be used in the future in IWF supports at CPS.
5	Tables 3.5.1, 3.5.2-3, 3.5.2-8 regarding AMR	3.5-62, 3.5-108, 3.5-135	Plant-specific note 1 in **LRA Table 3.5.2-3 "Control Building"** associated with AMR item 3.5.1-57 (E, 1) for sliding surfaces states: "The sliding supports and bearings for the steel beams that are part of **primary containment** personnel access walkway do not use Lubrite or	a) Clarify and correct the apparent discrepancy in the description and placement of plant specific notes 1, 10 associated with AMR item 3.5.1-57 with note E in LRA Tables 3.5.2-3, 3.5.2-8 and the discussion column in LRA

	Item 3.5.1-57		similar material but are instead steel to steel connections. The Structures Monitoring (B.2.1.34) Program is substituted to manage the aging effects for steel-to-steel surfaces consistent with the management of Lubrite surfaces." This note 1 in the Table for Control Building makes reference to primary containment and not control building. Plant specific note 10 in LRA **Table 3.5.2-8 "Primary Containment,"** associated with AMR item 3.5.1-57 (E, 10) for sliding surfaces states: "The Structures Monitoring (B.2.1.34) Program is substituted to manage the aging effects of steel-to-steel sliding surfaces." This note 10 makes no mention of Primary Containment. Further, the Discussion column in LRA Table 3.5.1, AMR item 3.5.1-57 states that the Structures Monitoring Program has substituted to manage loss of mechanical function of the carbon steel sliding surfaces exposed to air-outdoor for the Control Building, with no mention of Primary Containment. There appears to be an apparent discrepancy in the description and placement of plant specific notes 1, 10 associated with AMR item 3.5.1-57 with note E in LRA Tables 3.5.2-3, 3.5.2-8 and the discussion column in LRA Table 3.5.1.	Table 3.5.1. Update related LRA Tables accordingly.
6	Table 3.5.1, Item 3.5.1-74 (TRP 89)	3.5-73	Discussion column in LRA Table 3.5.1 states item 3.5.1-74 is "Not Applicable. CPS does utilize sliding surfaces…" Further, it goes on to state Items 3.5.1-75 and 3.5.1-57 will be used for sliding surfaces.	a) Clarify if the discussion column should say "Not Used" instead of "Not Applicable." If so, revise the LRA AMR item accordingly.

LRA Section B.2.1.34: Structures Monitoring

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.34	B-147	LRA XI.S6 AMP provides an enhancement No. 2 to the "scope of program" program element for listing components and commodities to be included within the scope of the Structures Monitoring program. Missile Barriers. This structural component type does not appear in the Structural Commodity Group table (LRA Table 3.5.2-11) or have a specific entry in the Component Supports Commodity Group table (LRA Table 3.5.2-2). Missile barrier is referenced multiple times as a "intended function" in multiple Tables 3.5.2-X. Additionally, missile barrier is referenced (within parentheses as part of "concrete elements" and "steel components") as "component" in LRA Tables 3.5.2-3 and 3.5.2-6. Sump and Pool Liners. This structural component type does not appear in the Structural Commodity Group table (Table 3.5.2-11) or have a specific entry in the Component Supports Commodity Group table (Table 3.5.2-2). Sump liners are not referred to anywhere in the application, and pool liners are referred to as a "component" associated with AMR item 3.5.1-78, though AMR item 3.5.1-37 refers to pool liners within the "discussion" column only.	**Scope of Program:** 1. Discuss the missile barriers used at Clinton site and clarify whether these are missile barrier components that need to be included in LRA Tables 3.5.2-2 and 3.5.2-11. 2. Provide or clarify Tables 1 and 2 AMR items for decking, sump and pool liners.

			<u>Metal Components (Decking).</u> This structural component type does not appear in the Structural Commodity Group table (LRA Table 3.5.2-11) or have a specific entry in the Component Supports Commodity Group table (LRA Table 3.5.2-2).	
2	B.2.1.34	B-147	LRA XI.S6 AMP provides an enhancement No. 3 to the “detection of aging effects” and “acceptance criteria” program elements for requiring that personnel performing inspections and evaluations meet qualifications specified within ACI 349.3R with respect to knowledge of inservice inspection of concrete and visual acuity requirements. GALL-LR XI.S6 AMP states in the “acceptance criteria” program element that the criteria are derived from design bases codes and standards that include ACI 349.3R, ACI 318, ANSI/ASCE 11, or the relevant AISC specifications, as applicable, and consider industry and plant operating experience. It appears that this enhancement No. 3 is inconsistent with the “acceptance criteria” program element described in GALL-LR XI.S6 AMP.	**Acceptance Criteria:** Clarify what acceptance criteria is being enhanced.
3	B.2.1.34	B-148	LRA XI.S6 AMP provides an enhancement No. 6 to the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements for including inspection of accessible sliding surfaces for indication of significant loss of material due to wear or corrosion and that debris or dirt will not restrict or prevent sliding.	**Acceptance Criteria:** Clarify acceptance criteria for accessible sliding surfaces.

			The LRA Structures Monitoring basis document (CL-PBD-AMP-XI.S6, Rev 2) states Element 6 “will be enhanced for sliding surfaces to include a) an inspection for indications of excessive loss of material due to corrosion or wear, and b) verify that no debris or dirt is present that could restrict or prevent sliding of surfaces as required by design”. GALL-LR XI.S6 AMP states in the “acceptance criteria” program element for sliding surfaces are (a) no indications of excessive loss of material due to corrosion or wear and (b) no debris or dirt that could restrict or prevent sliding of the surfaces as required by design.” It appears that this enhancement No. 6 is inconsistent with the “acceptance criteria” program element described in GALL-LR XI.S6 AMP.	
4	B.2.1.34	B-148	LRA XI.S6 AMP provides an enhancement No.7 to the “parameters monitored or inspected,” “detection of aging effects,” and “acceptance criteria” program elements for monitoring elastomeric vibration isolators and structural sealants for indication of loss of material, cracking or hardening results in loss of sealing or function. The LRA Structures Monitoring basis document (CL-PBD-AMP-XI.S6, Rev 2) states Element 6 “will be enhanced to address acceptability of elastomeric vibration isolators and structural sealants if the observed loss of material,	**Acceptance Criteria:** Clarify acceptance criteria for elastomeric vibration isolators and structural sealants.

			cracking, and hardening will not result in loss of sealing or function”. GALL-LR XI.S6 AMP states “elastomeric vibration isolation elements are acceptable if there is no loss of material, cracking, or hardening that could lead to the reduction or loss of isolation functions.” It appears that this enhancement No. 6 is inconsistent with the “acceptance criteria” program element described in GALL-LR XI.S6 AMP.	
5	B.2.1.34 Table 3.5.1	B-148 3.5-71	LRA XI.S6 AMP provides an enhancement 8 to the “acceptance criteria” program element for clarifying that loose bolts and nuts and cracked high strength bolts, not subject to stress corrosion cracking, are not acceptable unless accepted by engineering evaluations. GALL-LR XI.S6 AMP states in the “acceptance criteria” program element “loose bolts and nuts and cracked high strength bolts are not acceptable unless accepted by engineering evaluation.” Table 1 AMR item 3.5.1-69 in LRA Table 3.5.1 states that there is no high strength structural bolting subject to cracking due to stress corrosion cracking in structures and component supports at Clinton Power Station. It appears that this enhancement No. 6 is inconsistent with the “acceptance criteria”	**Acceptance Criteria:** 1. Clarify the type of bolts utilized at Clinton that apply to this enhancement. 2. Clarify what is meant by “not subject to stress corrosion cracking” in this enhancement and address the discrepancy between Table 1 AMR item 3.5.1-69 and this enhancement.

			program element described in GALL-LR XI.S6 AMP.	
6	Table 3.3.2-6 B.2.1.14	3.3-129 B-67	LRA Table 3.3.2-6 lists NUREG-1801 items III.B5.TP-248 and III.B5.TP-261 (and NUREG-1800 Table AMR items 3.5.1-80 and 3.5.1-88) as being applicable to the structural bolting for cranes, hoists, and refueling equipment systems. Note E,1 indicates that "The Inspection of Overhead Heavy Load and Light Load (Related to Fuel Handling) Systems (B.2.1.14) program is substituted to manage the aging effect(s) applicable to this component type, material, and environment combination." NUREG-1801 indicates that items III.B5.TP-248 and III.B5.TP-261 are instead applicable to structures and component supports for platforms, pipe whip restraints, jet impingement shields, masonry walls and other miscellaneous structures that their aging effects are managed by the Structures Monitoring program. Item 13 response on the portal (Clinton Safety>15 onsite Audit Document Request>Structural) indicates that Section VII.B of NUREG-2191 includes a row that is appropriate for structural bolting on cranes (VII.B.A-730) LRA Section B.2.1.14 states that the inspection of overhead heavy load and light load (related to refueling) handling systems AMP manages the aging effects of loss of material bridge, bridge rails, bolting, and trolley structural components	Clarify why these structural bolting components are applicable to the Table 2 AMR items associated with the Structures Monitoring program.

			for cranes, hoists, and rigging beams in air-indoor uncontrolled and treated water environments.	
7	B.2.1.34	NA	During the onsite audit, the staff noted large amount of corrosion on the cable tray supports within vaults, see Portal (Clinton Safety>03 AMP information>39 E3 Inaccessible>05 Inspection Results>0SHC-1D). WO 5114395-01 Results 0SHC-1D.pdf states that vault c had the largest amount of corrosion on the cable trays but were still structurally sound. However, this WO does not make clear whether these cable tray supports within vaults can maintain their structural integrity/intended functions during PEO.	1. Evaluate the corrosion conditions of the cable tray supports within vaults to determine whether they can maintain their structural integrity/intended functions during PEO. 2. Clarify whether the cable tray supports within vaults require more frequent inspections.

LRA Section B.2.1.34: Structures Monitoring Follow-Up Questions

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
8	Table 3.3.1	3.3-79	AMR item 3.3.1-111 (GALL item VII.A1.A-94) in GALL-LR report is for structural steel components of new fuel storage in the Auxiliary Systems. LRA claims AMR item 3.3.1-111 to be not applicable. However, it states, "With the exception of the Cranes, Hoists and Refueling Equipment System, there is no structural steel exposed to air – indoor uncontrolled in the Auxiliary Systems. The loss of material in structural steel exposed to air – indoor uncontrolled in the Cranes, Hoists and Refueling Equipment System is addressed in Item Number 3.3.1-52." The staff noted that the Cranes, Hoists and Refueling Equipment System is not new fuel storage. LRA Section 2.4.6 discusses new fuel storage rack and new fuel storage vault. LRA does not make clear whether there are structural steel components in new fuel storage of the Auxiliary Systems and how their aging effects are managed. LRA does not use the terms between "not applicable" and "not used" correctly.	1. Clarify whether there are structural steel components in new fuel storage of the Auxiliary Systems. If yes, provide Table 2 AMR items. 2. Explain how their aging effects of these steel structural steel components are managed. 3. Revise LRA accordingly based on the responses above.

LRA Section B.2.1.35, A.2.1.35, Water-Control Structures

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.35	B-152	GALL LR Report AMP XI.S7 in "Parameters Monitored or Inspected" program element states that "Accessible sliding surfaces are monitored for indication of significant loss of material due to wear or corrosion, debris, or dirt." LRA does not make clear whether there are sliding surfaces for water-control structures in the scope of the LRA. Section 3.3 of the AMP basis document CL-PBD-AMP-XI.S7 states that "The Screen House and in-scope portions of the Cooling Lake do not include wooden components or sliding surfaces."	**Parameters Monitored or Inspected:** Confirm in the LRA that there are no sliding surfaces in the water-control structures.
2	B.2.1.35	B-152	GALL LR Report AMP XI.S7 in "Detection of Aging Effects" program element states that "NRC RG 1.127 describes periodic inspections to be performed at least once every 5 years." LRA Section B.2.1.35 states that "Elements of the program effectively detect the applicable aging effects at a frequency adequate to prevent significant age-related degradation and take corrective action to prevent a loss of intended function." Section 3.4 of the basis document CL-PBD-AMP-XI.S7 states that "Periodic inspections of the Screen House and the in-scope portions of the Cooling Lake are performed at least once every five years, which aligns with the recommendation within RG 1.127."	**Detection of Aging Effects:** Clarify inspection frequencies for the Water-Control Structures in LRA.

3	B.2.1.35	B-153	Enhancement 3 listed in LRA Section B.2.1.35 states that “Document current practices in implementing procedure for inspection of the cooling lake baffle dike. Program Elements Affected: Acceptance Criteria (Element 6).” LRA does not make clear what the acceptance criteria for the cooling lake baffle dike are.	**Acceptance criteria:** Clarify acceptance criteria for the cooling lake baffle dike.
4	B.2.1.35	B-153	GALL LR Report AMP XI.S7 in “Acceptance Criteria” program element states that “Loose bolts and nuts, cracked high strength bolts, and degradation of piles and sheeting are accepted by engineering evaluation or subject to corrective actions.” LRA Section B.2.1.34 “Structures Monitoring” includes Enhancement 8 for the loose bolts and nuts, cracked high strength. Clarify whether this enhancement in LRA Section B.2.1.34 is applicable to water-control structures.	**Acceptance criteria:** Clarify whether the Enhancement 8 in LRA Section B.2.1.34 is applicable to water-control structures. **(See TRP 46 breakout question on the Enhancement 8 in LRA Section B.2.1.34.)**

5	Table 3.5.1 Table 3.5.2-2 Table 3.5.2-10	3.5-77 3.5-93 3.5-146	Discussion for LRA Table 3.5.1, AMR Item 3.5.1-83 states that "The RG 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants (B.2.1.35) program will be used to manage loss of material of the steel bolting, concrete anchors, and embedments exposed to the water – flowing and air outdoor environments." However, some of the LRA Table 3.5.2-10 items associated with Item 3.5.1-83 have the "air – indoor, uncontrolled" environment" as well. Discussion for LRA Table 3.5.1, AMR Item 3.5.1-83 states that "The ASME Section XI, Subsection IWF (B.2.1.31) program will be used to manage loss of material of carbon steel supports exposed to water - flowing environment." LRA Table 3.5.2-2 lists supports for ASME Class 2 and 3 piping and components associated with AMR Item 3.5.1-83 and uses the ASME Section XI, Subsection IWF program with Note "E, 2," which states: "These component supports are not included in the Regulatory Guide 1.127, Inspection of Water-Control Structures Associated with Nuclear Power Plants program. The ASME Section XI, Subsection IWF Program will be substituted." Supports for ASME Class 2 and 3 Piping and Components are unrelated with RG 1.127 AMP and their aging effects are supposed to be managed by the ASME Section XI, Subsection IWF program.	1. Address the discrepancy of the environments between LRA Tables 1 and 2 AMR items. 2. Evaluate the applicability of GALL Item III.A6.TP-221 for the supports for ASME Class 2 and 3 piping and components and revise this line item accordingly.

6	Table 3.5.1 Table 3.5.1 Table 3.5.2-4	3.5-64 3.5-66 3.5-110	1. Discussion for LRA Table 3.5.1, AMR Item 3.5.1-59 states that this item is used, among others, for masonry walls but none of the Table 2 items associated with Item 3.5.1-59 is associated with masonry walls. 2. LRA Section B.2.1.35 states that “There are no surface dams, canals, steel or wood piles and sheeting, or sluice gates within the scope of the program.” However, Discussion for LRA Table 3.5.1, AMR Item 3.5.1-62, states “There are no Wooden Piles; sheeting subject to loss of material; change in material properties in Structures and Component Supports,” which is inconsistent with the statement in LRA Section B.2.1.35. 3. LRA Table 3.5.2-4 lists inaccessible concrete components associated with Table 1 AMR item 3.5.1-44 and GALL item III.A6.TP-30 exposed to groundwater/soil environment. GALL item III.A6.TP-30 refers to all concrete components including both accessible and inaccessible concrete areas	1. Clarify whether masonry walls are addressed by LRA Table 3.5.1, Item 3.5.1-59. 2. Address the discrepancy between LRA Section B.2.1.35 and Table 3.5.1. 3.Address the discrepancy of concrete areas between AMR item and GALL report.
7	Table 3.5.2-4	3.5-111	LRA Table 3.5.2-4 only lists Table 2 AMR items for the baffle dikes. LRA does not provide Table 2 AMR items for the submerged dam.	Provide Table 2 AMR items for the submerged dam.

LRA Section 3.5.2.2.1.2, 3.5.2.2.1.7, 3.5.2.2.1.8, 3.5.2.2.1.9, 3.5.2.2.2.2, Concrete

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	3.5.2.2.1.2 3.5.2.2.2.2	3.5-19 3.5-32	LRA Section 3.5.2.2.1.2 states that the average air temperature is maintained by recirculating air through the Primary Containment Ventilation System. The same section also states that the high temperature of penetrations is maintained by stainless steel metallic reflective insulation (RMI) and the component cooling water system for penetration cooling coils. LRA Section 3.5.2.2.2.2 states that the bulk average temperature for Group 4 structures is maintained by recirculating air through the Primary Containment Ventilation System. The same section also states that process piping operating at temperatures greater than 200 °F is insulated through penetrations and the insulation in combination with compartment air circulation reduces concrete local temperature to less than the 200 °F. However, LRA does not make clear what aging management programs (AMPs) manage aging effects of the Primary Containment Ventilation System, the stainless steel metallic reflective insulation (RMI), the component cooling water system, insulation for process piping operating at temperatures greater than 200 °F, and the system for compartment air circulation. In addition, LRA does not make clear what type of insulation is used for the process piping.	1. Clarify the aging effects/aging mechanisms and associated AMPs used for the Primary Containment Ventilation System, stainless steel metallic reflective insulation (RMI), the component cooling water system for penetration cooling coils, insulation for process piping operating at temperatures greater than 200 °F, and the system for compartment air circulation. 2. Clarify the type of insulation used for the process piping operating at temperatures greater than 200 °F and what AMP is used to manage its aging effects.

2	3.5.2.2.1.7	3.5-24	LRA Section 3.5.2.2.1.7 states that "There are however, no above-ground accessible concrete portions of the containment that are susceptible to freeze-thaw cycles; as the containment concrete walls and dome are completely enclosed by the metal siding of the gas control boundary, the Auxiliary Building, and the Fuel Building. The concrete containment walls below grade are also enclosed by the Auxiliary Building." LRA does not make clear how the metal siding of the gas control boundary protects the concrete from the air-outdoor environment so that free-thaw cycles will not be applicable. Discussion for LRA Table 3.5.1, AMR Item 3.5.1-11 states that this item is not applicable. However, applicability of this item will depend on the effectiveness of the metal siding of the gas control boundary in protecting the containment concrete from the freeze-thaw. LRA Section 3.5.2.2.1.7 states that "the concrete mix design provides for low permeability, by incorporating fly ash and water reducing agents, and adequate air entrainment (3% plus or minus 1%) such that the concrete has good freeze-thaw resistance." However, 2% to 4% of entrained air used at Clinton site is out of range for the air content of 3% to 8% specified in SRP-LR Section 3.5.3.2.1.7.	1. Provide a justification on how the metal siding of the gas control boundary protects the containment concrete from freeze-thaw. 2. Provide Table 2 AMR items if the containment concrete is subject to the freeze-thaw. 3. Clarify the ACI and ASTM standards/versions used for the concrete mix design including the air entrainment content and clarify whether concrete mix design provides for low permeability and adequate air entrainment such that the concrete has good freeze-thaw resistance. 4. Clarify whether there are operating experiences regarding loss of material and cracking due to freeze-thaw in the Containment. If yes, provide evaluations and confirm whether they impacted intended functions of the Containment concrete structure. 5. Provide justification whether a plant-specific AMP is required to manage the aging effect of loss of material (spalling, scaling) and cracking due to freeze-thaw.

LRA Section /AMP None, Corrosion Material

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	3.2	3.2-25 (PDF Pg-397)	LRA Table 3.2.1 states that AMR item 3.2.1-48 will be used to manage loss of material of the stainless-steel piping, piping components, and piping elements, and tanks exposed to condensation in the: -Standby Liquid Control System, -Reactor Core Isolation Cooling System, -Residual Heat Removal (RHR) System, and -Standby Gas Treatment System. However, the staff notes that the discussion of AMR item 3.2.1-48 is not used for the RHR System Evaluation (LRA Table 3.2.2-4).	Please discuss the use of AMR item 3.2.1-48 for the RHR system, considering the apparent discrepancy between the discussion in LRA Table 3.2-1 and the AMR items used in LRA Table 3.2.2-4.
2	3.2.2.2.5	PDF Pg-381	LRA Section 3.2.2.2.5 cites that the AMR item 3.2.1-6 is applicable, and states that this item considers the potential for flow blockage/fouling of containment spray nozzles and flow orifices exposed to air-indoor (uncontrolled) environment. It does not describe how the potential aging effects will be managed. The AMR item 3.2.1-6 discussion in Table 3.2.1 (PDF Pg-385) states that the One-Time Inspection program will be used to manage flow blockage/fouling of the stainless-steel spray nozzles in the Residual Heat Removal system and refers to Subsection 3.2.2.2.5.	Please clarify the discussion in Section 3.2.2.2.5 to identify the AMP that will be used to manage the potential aging effects, consistent with the Table 3.2.1 discussion of item 3.2.1-6.

LRA Section 3.5.2.2.2.1, 3.5.2.2.2.3, Inaccessible Areas

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	3.5.2.2.2.1 Item 1 3.5.2.2.2.3 Item 1	3.5-27 3.5-33	LRA Section 3.5.2.2.2.1, Item 1 and LRA Section 3.5.2.2.2.3, Item 1 state that "the concrete mix design provides for low permeability, by incorporating fly ash and water reducing agents, and adequate air entrainment (3% plus or minus 1%) in the air-outdoor environment such that the concrete has good freeze-thaw resistance." However, 2% to 4% of entrained air is out of range for the air content of 3% to 8% specified in SRP-LR Section 3.5.3.2.2.1, Item 1 and SRP-LR Section 3.5.3.2.2.3, Item 1. LRA Section 3.5.2.2.2.1, Item 1 and LRA Section 3.5.2.2.2.3, Item 1 state that "Structural reinforced concrete has not exhibited significant loss of material (spalling, scaling) and cracking due to freeze-thaw in accessible areas of in scope reinforced concrete structures." The wording "significant" is vague. LRA does not make clear whether there is operating experience regarding loss of material and cracking due to freeze-thaw.	1. Clarify the ACI and ASTM standards/versions used for the concrete mix design including the air entrainment content and clarify whether concrete mix design provides for low permeability and adequate air entrainment such that the concrete has good freeze-thaw resistance. 2. Clarify whether there is operating experience regarding loss of material and cracking due to freeze-thaw in below-grade inaccessible concrete areas of Groups 1-3, and 5-9 structures. If yes, provide evaluations and confirm whether they impacted intended functions of those concrete structures. 3. Provide justification whether a plant-specific AMP is required to manage the aging effect of loss of material (spalling, scaling) and cracking due to freeze-thaw. 4. Evaluate the wording "significant" used for describing operating experience and revise it accordingly.
2	3.5.2.2.2.1 Item 3	3.5-27	LRA Section 3.5.2.2.2.1, Item 3 states that "Table 3.5.1 Item Numbers 3.5.1-45 and 3.5.1-46: These item numbers are not applicable." However, regardless of the use of porous concrete subfoundation, differential settlement is an applicable aging effect.	Clarify the applicability of LRA Table 3.5.1, AMR Items 3.5.1-45 and 3.5.1-46 and provide Table 2 AMR items if these Table 1 AMR items are applicable.

3	3.5.2.2.2.1 Item 4 3.5.2.2.2.3 Item 3	3.5-30	LRA Section 3.5.2.2.2.1, Item 4 states that "The effects of carbonation are applicable to the water–flowing environment but has not been observed at Clinton Power Station reinforced concrete structures" and "Operating experience at Clinton Power Station, which inspects for concrete deterioration due to any aging effect and mechanism, has not identified an increase in porosity and permeability and loss of strength due to these mechanisms." Similarly, LRA Section 3.5.2.2.2.3, Item 3 states that "Concrete degradation due to chemical attack or leaching has not been observed at Clinton Power Station." However, the same sections provide operating experiences regarding leaching, describing efflorescence found in the Screen House and Fuel Building. LRA contains inconsistent information for operating experiences.	1. Address the discrepancies of operating experience in LRA. 2. For the operating experiences regarding leaching observed in below grade inaccessible concrete areas of Groups 1 to 9, clarify whether they impacted intended functions of these concrete structures.
4	3.5.2.2.2.3 Item 2	3.5-34	LRA Section 3.5.2.2.2.3, Item 2 states that "The Cooling Lake structure is submerged beneath the surface of the lake and not readily accessible for visual inspection," which is inconsistent with the visual inspections performed per the plant implementation procedures.	Clarify how visual inspections for the Cooling Lake structures submerged beneath the surface of the lake, including the submerged dam and baffle dike, are performed.

5	Table 3.5.1	3.5-54 3.5-58	LRA Table 3.5.1, Item 3.5.1-42 and Item 3.5.1-49 are associated with NUREG-1801 Items III.A3.TP-108 and III.A6.TP-110 that address only the air-outdoor environment. However, Table 2 AMR items associated with AMR Items 3.5.1-42 and 3.5.2-49 include groundwater/soil environment and cite Note A. If a new environment is identified, Note G needs to be used.	Address Table 2 AMR items associated with Table 1 AMR Items 3.5.1-42 and 3.5.1-49 for concrete components exposed to groundwater/soil environment.
6 (Follow-up question)	3.5.2.2.2.1 Item 1 3.5.2.2.2.3 Item 1	3.5-27 3.5-33	The staff reviewed LRA Supplement 1, Change #12 and finds the following changes: 1. In the fourth paragraph of LRA Section 3.5.2.2.2.1, Item 1, the first sentence has been changed to "Structural reinforced concrete has exhibited inconsequential loss of material (spalling, scaling) and cracking due to freeze-thaw in accessible areas of in scope reinforced concrete structures." 2. In the third paragraph of LRA Section 3.5.2.2.2.3, Item 1, the first sentence has been changed to "Structural reinforced concrete has exhibited inconsequential loss of material (spalling, scaling) and cracking due to freeze-thaw in accessible areas of in scope reinforced concrete structures." LRA does not make clear whether the observed degradations related to loss of material (spalling, scaling) and cracking due to freeze-thaw have any impact on the intended function of the concrete structures.	Regarding Groups 1-3, 5 and 7-9 structures in LRA Section 3.5.2.2.2.1, Item 1 and Group 6 structures in LRA Section 3.5.2.2.2.3, Item 1, clarify in LRA whether the applicant's evaluation can conclude that the observed degradations related to loss of material (spalling, scaling) and cracking due to freeze-thaw have no impact on the intended function of the concrete structures. If not, provide plant-specific AMPs to demonstrate how the effects of aging are adequately managed during the PEO.

7 (Follow up question)	Table 3.5.1 Items 3.5.1-24 and 3.5.1-67	Table 1 AMR item 3.5.1-24 addresses aging effects of increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack for both accessible and inaccessible concrete containment components, which are managed by the ASME Section XI, Subsection IWL program. LRA Table 3.5.1 claims AMR item 3.5.1-24 to be consistent with NUREG-1801. However, the staff finds that LRA lacks Table 2 items associated with AMR item 3.5.1-24 for accessible concrete containment components, which are related to NUREG-1801 Item II.B3.2.CP-84. Table 1 AMR item 3.5.1-67 addresses aging effects of increase in porosity and permeability; cracking; loss of material (spalling, scaling) due to aggressive chemical attack for Groups 1-5, 7, 9: Concrete: interior; above-grade exterior, Groups 1-3, 5, 7-9 – concrete (inaccessible areas): below-grade exterior; foundation, Group 6: concrete (inaccessible areas): all, which are managed by the Structures Monitoring program. LRA Table 3.5.1 claims AMR item 3.5.1-67 to be consistent with NUREG-1801. However, the staff finds that LRA lacks Table 2 items associated with AMR item 3.5.1-67 for interior or above-grade exterior (i.e., accessible) concrete components, which are related to NUREG-1801 Items III.A1.TP-28, III.A3.TP-28, and III.A5.TP-28. Since component, material, and environment exist, aging effects require aging management. Both the ASME Section XI, Subsection IWL	1. Provide Table 2 items associated with AMR item 3.5.1-24 for accessible concrete containment components exposed to air-indoor, uncontrolled or air-outdoor environment (i.e. NUREG-1801 Item II.B3.2.CP-84). 2. Provide Table 2 items associated with AMR item 3.5.1-67 for interior or above-grade exterior concrete components exposed to air-indoor, uncontrolled or air-outdoor environment (i.e. NUREG-1801 Items III.A1.TP-28, III.A3.TP-28, and III.A5.TP-28).

		program and the Structures Monitoring program will manage effects of aging by inspecting all of the accessible concrete components and using the conditions identified in accessible areas to evaluate the acceptability of inaccessible areas.	

LRA Section 3.5.2.2.1.1, Settlement

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	Table 3.5.1	3.5-39	Discussion for LRA Table 3.5.1, AMR item 3.5.1-2 states that this item is not applicable. However, regardless of the use of porous concrete subfoundation, differential settlement should be an applicable aging effect.	Clarify the applicability of LRA Table 3.5.1, AMR Item 3.5.1-2 and provide Table 2 AMR items if it is applicable.

LRA Sections 3.2.2.2.3.2, 3.2.2.2.6, 3.3.2.2.3, 3.3.2.2.5, 3.4.2.2.2, 3.4.2.2.3, Stainless Steel

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	3.3.2.2.5 Table 3.3-1 Table 3.3.2-15	3.3-31 3.3-36 3.3-212 3.3-215	Table 3.3.1 and FE Section 3.3.2.2.5 state that item 3.3.1-6 is not applicable, and that there are no stainless steel piping, piping components, piping elements, or tanks exposed to outdoor air in the Auxiliary Systems. However, item 3.3.1-6 is used twice in Table 3.3.2-15, Process Radiation Monitoring System. Table 3.3-1 also identifies item 3.3.1-4 as not applicable and states that there are no stainless steel piping, piping components, piping elements, or tanks exposed to outdoor air in the auxiliary systems.	Please clarify the applicability of AMR items 3.3.1-4 and 3.3.1-6, and describe any associated changes needed in the LRA.

2			The guidance in Further Evaluation (FE) Sections 3.2.2.2.3.2, 3.3.2.2.6, 3.3.2.2.3, 3.3.2.2.5, 3.4.2.2.2, and 3.4.2.2.3 addresses loss of material due to pitting or crevice corrosion, and cracking due to stress corrosion cracking, for stainless steel exposed to outdoor air (including air recently introduced into buildings). The guidance states that an applicant may demonstrate that the further evaluation item is not applicable by describing the outdoor air environment present at the plant and demonstrating that external pitting corrosion, crevice corrosion, or stress corrosion cracking are not expected. The LRA states that these sections and the associated AMR items are not applicable based on there being no operating experience with these aging effects. The basis for "not applicable" is not clear based on lack of detection alone, because (a) there is no direct information about whether the outdoor air environment contains species such as chloride from road treatment, (b) the FE sections do not state whether there are applicable components, (c) two of the associated AMR items (3.2.1-4 and 3.2.1-7) do not state whether there are applicable components, and (d) there is a discrepancy about the applicability of AMR item 3.3.1-6 as described in the previous question.	Please provide the following: a. Describe the outdoor air environment with respect to sources of contaminants, particularly, chlorides, that could concentrate and cause pitting corrosion, crevice corrosion, or stress corrosion cracking of stainless steel components. b. Clarify the applicability of these aging effects in the FE sections or associated AMR item writeups.

3	N/A	N/A	AR01682117 describes an observation of duct tape found on stainless steel during walkdown inspections online and during outage C1R14. It also refers operating experience with a leak in a stainless steel pipe from outside-diameter chloride-induced stress corrosion cracking (SCC) attributed to duct tape and a protective covering. The operating experience appears to be associated only with a different plant, but it is not clear how the issue was dispositioned at Clinton.	Please describe any actions taken in response to the walkdown observation of duct tape on stainless steel and the concern that this condition (for the pipe identified or for unidentified components) could result in SCC or loss of material from pitting or crevice corrosion.

LRA Appendix B Aging Management Program (AMP) Section: B.2.1.4, "BWR Vessel ID Attachment Welds"

LRA Appendix A AMP FSAR Supplement Section: A.2.1.4, "BWR Vessel ID Attachment Welds"

Question Number	**LRA Section**	**LRA Page**	**Background / Issue** **(As applicable/needed)**	**Discussion Question / Request**
1	A.2.1.4 B.2.1.4	A-11 B-26	Inconsistency between Appx. A (USAR Supplement) and Appx. B (AMPs) descriptions.	The BWR Vessel ID Attachments Welds AMP is described as, "…an existing condition monitoring program that includes the inspection and evaluation recommendations within BWRVIP-48-A and the requirements of ASME Code, Section XI, Subsection IWB and the Water Chemistry (A.2.1.2) program." In contrast, Appendix B of the LRA states that, "The program substitutes the inspection and evaluation recommendations within BWRVIP-48-A for the requirements within ASME Code, Section XI." The LRA references an ISI alternative (No. I4R-06) authorized under the 10

				CFR 50.55a(z)(1) provisions in a safety evaluation (SE) issued on November 4, 2020 (ADAMS Accession No. ML20268C232). Confirm what the AMP will be that is used to manage aging effects in the PEO. (a) If both BWRVIP-48-A guidance and ASME Section XI requirements will be followed, explain how the discrepancy between Appendix A and Appendix B will be resolved. (b) If the intent is to substitute BWRVIP-48 guidance for ASME Section XI requirements, note that such an alternative may not be approved as part of the license renewal process. Approval of an alternative for one 10-year ISI interval is not equivalent to approval of the alternative for a 20-year period of extended operation, and such an alternative may not be granted as part of license renewal.

Clinton Power Station
License Renewal Application (LRA) Breakout Audit Questions

LRA Sections 4.2.8, 4.2.9, and B.2.1.9

BWR Vessel Internals TLAAs and AMP

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.2.8 4.2.9	4.2-51 4.2-52	The applicant cites GEH proprietary report 007N3874 Revision 0 to justify the proposed disposition of the TLAAs for the jet pump beam bolts, core plate bolts, and core shroud stabilizer assembly bracket. While 007N3874 describes clamping loads, it does not describe how clamping load was determined. 007N3874 references another report that is not currently on the applicant's sharepoint site: 006N4971.	Describe how the applicant determined the clamping loads referenced in 007N3874. If appropriate, upload document 006N4971 to the sharepoint site for staff review.
2	4.2.9	4.2-52	The applicant stated that the peak fluence projections at 52 EFPY are less than the fluence assumed in the original design evaluation, implying that the original analysis remains valid for the period of extended operation. However, the applicant proposed to disposition this TLAA according to 10 CFR 54.21(c)(1)(ii), implying that the clamping load analysis was updated to account for the period of extended operation.	Clarify whether the clamping load analysis was updated. Explain whether disposition according to 10 CFR 54.21(c)(1)(i) is appropriate for this TLAA.
3	B.2.1.9	B-41 through B-47	The BWR Vessel Internals AMP consists of implementation of a wide range of NRC-approved BWRVIP topical reports that address inspections, flaw evaluation, repair, and other issues. On February 19, 2021, EPRI issued a Part 21 Transfer of Information Notice (ML21084A164) regarding potential nonconservatism in BWRVIP-100, Rev 1-A. This report addresses toughness of irradiated stainless steels to be used in flaw evaluations.	Describe actions taken in response to the Transfer of Information Notice. Consider uploading appropriate documents to the portal for staff review.

LRA Section TLAA: 4.6, Primary Containment Fatigue Analyses

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.6.1	4.6-2	LRA Section 4.6.1 provides TLAA evaluations for two types of transients: monitored transients and unmonitored transients, claiming consistency with 10 CFR 54.21(c)(1)(i). However, it is not clear whether this is consistent with SRP-LR Section 4.6.3.1.1.1. Per SRP-LR Section 4.6.3.1.1.1, the number of assumed transients in the existing analysis needs to be compared with the extrapolation to 60 years of operation of the number of operating transients experienced to date. It is not clear how monitored and unmonitored transients are related to operating transients experienced to date and whether unmonitored transients have never happened to the plant.	1. Clarify how unmonitored transients are related to transients the plant has experienced to date. 2. In addition, clarify if monitored transients are all transients that have occurred to the plant to date only. 3. If not, consider combining monitored and unmonitored transients, as appropriate, to estimate the number of transients the plant experienced to date.
2	4.6.1	4.6-3	Based on Table 4.6.1-2, LRA states that "these 24 calculations computed CUF values that were less than or equal to 0.19." However, it is noted that the maximum CUF in the table is actually 0.386 for 1MC-52 and 1MC-53.	Fix the numerical typo or provide justification for the existing value.
3	4.6.1	4.6-5, 4.6-6	In LRA Table 4.6.1-2, it is stated that the projected transient occurrences in 60 years are significantly less than 40 for 1MC-24, 1MC-26, 1MC-38, 1MC-31 and 1MC-33 penetrations. The number of transients expected in another 20 years needs to be provided and compared with the number of assumed transients used in the existing CUF.	Provide the number of projected transient occurrences in 60 years for comparison with the number of assumed transients used in the existing CUF.

4	4.6.1	4.6-2	For the calculations that assumed only monitored transients, LRA states that all of these 95 penetrations have CUF values less than or equal to 0.414. Based on the staff's review of 4.9.101 – Penetrations Breakdown Attachment, the staff did not have sufficient information to determine what transients were considered in the original design analysis of the penetration for the following penetrations: 1MC-17, 1MC-35, 1MC-36, 1MC-41, 1MC-42, 1MC-43, 1MC-45, 1MC-46, 1MC-61, 1MC-68, 1MC-89, 1MC-102, 1MC-107, 1MC-108, 1MC-109, 1MC-110, 1MC-152, 1MC-153, 1MC-160, 1MC-172, 1MC-173, 1MC-203 LRA further states that the projected 60- year occurrences are significantly less than the occurrences assumed in the 95 calculations except for two transients and concludes that these 95 design calculations remain valid for 60 years of operation in accordance with 10 CFR 54.21(c)(1)(i). However, it is not clear how this conclusion has been made without comparing the number of assumed transients in the original design calculation with their 60 year projections for each penetration. The fourth column of Table 4.6.1-1, Number of Calculations Which Assumed This Transient indirectly provides this information, but this information is not sufficient to verify the conclusion.	1. Identify and provide the number of projected transient occurrences in 60 years for comparison with the number of assumed transients used in the existing CUF for the following penetrations: 1MC-17, 1MC-35, 1MC-36, 1MC-41, 1MC-42, 1MC-43, 1MC-45, 1MC-46, 1MC-61, 1MC-68, 1MC-89, 1MC-102, 1MC-107, 1MC-108, 1MC-109, 1MC-110, 1MC-152, 1MC-153, 1MC-160, 1MC-172, 1MC-173, 1MC-203 2. For the calculations considering Hydro Test (18) and Misc. Head Spray (2), confirm that the assumed number of plant transients considered in the original analysis remain valid for the period of extended operation.
5	A.4.6.10		The last sentence ends with "~ in accordance with 10 CFR 54.21(c)(1)(i) instead of 10 CFR 54.21(c)(1)(iii).	Change 10 CFR 54.21(c)(1)(i) to 10 CFR 54.21(c)(1)(iii) in the last sentence to be consistent with the evaluation.

6	4.6.9	4.6-15	Containment liner corrosion assessment is dispositioned in accordance with 10 CFR 54.21(c)(1)(ii). Not clear if this is appropriate as there was no review of operating transient experience and a list of the increased number of assumed cyclic loads projected to the end of the period of extended operation. Should this be dispositioned per CFR 54.21(c)(1)(iii)? Alternatively, this may be moved to Section 4.7. In addition, the staff noted that LRA Section 3.5.2.2.1.3 cites the ASME Section XI, Subsection IWE program and the 10 CFR Part 50, Appendix J to manage the loss of material of steel elements in both the accessible and the inaccessible areas of the containment liner. This needs to be described in Section 4.6.9.	1. Provide justification for why the containment liner corrosion assessment can be dispositioned per CFR 54.21(c)(1)(ii). 2. Describe the fact that the ASME IWE program and Appendix J are credited to manage the aging effects of the containment liner to ensure the liner corrosion assessment remains valid for the period of extended operation.
7	4.6.8	4.6-13	LRA states that it is not credible that CPS will experience this number of transient occurrences over a 60-year service life. However, no clear basis is provided for this conclusion. Furthermore, it is not clear which transients were considered in the original design analysis.	Provide information of the type of applicable transients and the number of transient cycles to date and their extrapolation to 60 years.

8	4.6.4	4.6-9	LRA states that these five components were demonstrated to meet the six conditions in NE-3222.4(d) and, therefore, a more comprehensive fatigue evaluation in accordance with NE-3222.4(e) is not required. The staff reviewed the associated basis document (EC 0638891) and noted that comparisons were made of the conditions stipulated in NE.3224(d) (1) through (5) and the corresponding plant specific estimates or assumed values. However, the staff noted that there was no such comparison made for the sixth condition (NE.3224(d) (6)). LRA simply states that References (9) and (10) do not identify that the drywell or containment components would experience significant fluctuations due to mechanical loads (excluding pressure transients). This is a qualitative assessment and it is not clear how this conclusion was made without estimating and comparing load stresses with the S_a value as required by NE.3224(d) (6).	Provide justification for the qualitative conclusion made with respect to how the five components met the sixth condition of NE.3224(d). Otherwise, provide a quantitative basis for how the five components meet the condition by comparing load stresses with the S_a value.
9	4.6.3	4.6-8	LRA states that the evaluation calculated a CUF value of 0.0144 assuming 1800 SRV actuations during the 40-year life of the station. However, the staff noted, based on the review of the basis document (DC-SD-03-C0), that 1800 was an error and changed back to 1000 as done in the original design analysis. This inconsistency needs to be resolved.	Provide justification for why 1800 SRV actuations are appropriate in the design analysis as opposed to 1000. Otherwise, resolve this inconsistence and update documentation accordingly.

LRA Section AMP B.2.1.38, Insulation Material for Electrical Cables-Connections Not Subject to 10 CFR 50.49 EQ Requirements Used in Instrumentation Circuits

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.38	B-163	NUREG 1801-LR XI.E2 Program description states: An adverse localized environment is a condition in a limited plant area that could increase the rate of aging of a component or have an adverse effect on operability. Exposure of electrical cable and connection insulation material to ALE can result in insulation resistance (IR). CPS LRA section B.2.1.38 program description does not include the ALE condition description and if IR is a concern for all circuits or specific circuits.	Provide an ALE description and determine what localized areas are characterized as ALEs and specify what circuits in this AMP are applicable in the reduction in IR.
2	B.2.1.38	B-163	NUREG 1801 LR XI.E2-Program description identifies the AMP has two methods used to identify the existence of age-related degradation. CPS LRA Section B.2.1.38 program description is not clear what two methods will be used to identify the existence of age-related degradation.	Clarify the program description to include the first and second method used to identify the existence of age-related degradation.
3	B.2.1.38	B-164	CPS LRA Section B.2.38 program description is silent on what occurs when calibration, surveillance, or cable system test results do not meet the acceptance criteria.	Provide a determination statement in the program description to include when an unacceptable condition is identified with the calibration results what will occur afterwards (such as if the cable system testing frequency needs to be increased or results will be entered into a CAP).

4	B.2.1.38	B-164	CPS LRA Section B.2.38 operating experience (OE) section does not include the technical information and guidance used to evaluate and provide its technical basis	Provide what technical information and guidance was considered in informing the AMP OE.
5	B.2.1.38	OE	Does this new Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 EQ used in I&C AMP have a program health report to ascertain no issues exist with the electrical cable and connections used in instrumentation circuits	Provide any recent health reports to demonstrate that there are no issues with the electrical cable and connections used in instrumentation circuits.
6	B.2.1.38	OE	Will this AMP receive effectiveness review in accordance with the guidance of NEI 14-12.	Provide a response if it is applicable.

LRA Section 4.3.2, "ASME Section III, Class 1 and Environmentally Assisted Fatigue Analyses"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.2	4.3-13 4.3-8	LRA Section 4.3.2 addresses the Class 1 fatigue and environmentally-assisted fatigue (EAF) time-limited aging analysis (TLAA). The LRA section indicates that EAF fatigue calculations were performed for the component locations listed in NUREG/CR-6260 for newer-vintage BWRs, and other potentially bounding component locations. The 60-year projected environmentally adjusted cumulative usage factor (CUF_{en}) values are described in LRA Table 4.3.1-2. In comparison, NUREG/CR-6260 lists the following EAF locations for a newer-vintage BWR that is applicable to the Clinton Power Station: (1) reactor vessel shell and lower head; (2) reactor vessel feedwater nozzle; (3) reactor recirculation piping (including inlet and outlet nozzles); (4) core spray line reactor vessel nozzle and associated Class 1 piping; (5) residual heat removal (RHR) Class 1 piping; and (6) feedwater line Class 1 piping. However, LRA Table 4.3.1-2 does not clearly describe which EAF locations evaluated in the table address the NUREG/CR-6260 locations.	1. Clarify which EAF locations evaluated in LRA Table 4.3.1-2 address the NUREG/CR-6260 locations. As part of the discussion, describe which EAF locations in the table address the reactor vessel lower heads and reactor recirculation inlet and outlet nozzles. 2. If some of the NUREG/CR-6260 locations are bounded by other NUREG/CR-6260 location in the evaluation discussed in LRA Table 4.3.1-2, describe the NUREG/CR-6260 locations and the their bounding locations in terms of EAF.

2	4.3.2	4.3-13	LRA Section 4.3.2 indicates that the screening values of environmental fatigue correction factor (F_{en}) are based on the component material, maximum operating temperature, and bounding dissolved oxygen. The LAR also indicates that sulfur content is also an input for carbon and low alloy steels component F_{en} screening values. However, LRA Section 4.3.2 does not clearly discuss how the applicant determined conservative sulfur content (for carbon and low alloy steels) and strain rates in the screening EAF evaluations. In addition, the staff needs clarification on how the applicant removed the conservatism associated with the CUF_{en} values in the detailed EAF evaluation after the screening EAF evaluation.	1. Describe how the applicant determined conservative sulfur content (for carbon and low alloy steels) and strain rates in the screening EAF evaluations. 2. Describe how the applicant removed the conservatism associated with the CUF_{en} values in the detailed EAF evaluation after the screening EAF evaluation.

3	4.3.2	4.3-14	LRA Section 4.3.2 indicates that the some of the EAF locations were eliminated in the screening EAF evaluation if those locations are bounded by the other locations in terms of CUF_{en}. LRA Section 4.3.2 also explains that that component locations, which were eliminated in the screening, were originally evaluated to the same technical rigor as those bounding component locations that were screened in. However, LRA Section 4.3.2 does not clearly discuss how the applicant determined the level of technical rigor and the associated conservatism for the EAF locations in the screening evaluation.	1. Discuss how the applicant determined the level of technical rigor and the associated conservatism for the EAF locations in the screening evaluation.
4	4.3.2	4.3-13	LRA Section 4.3.2 addresses the EAF TLAA for Class 1 piping systems. The 60-year projected CUF_{en} values for the limiting (bounding) EAF locations are described in LRA Table 4.3.1-2. However, LRA Table 4.3.1-2 does not describe the materials of the limiting locations. The staff also needs clarification on whether the applicant eliminated certain EAF locations based on the more limiting EAF locations fabricated with a different material (e.g., a low alloy steel location was eliminated in consideration of the more limiting stainless steel location in the screening evaluation for EAF).	1. Provide the materials of fabrication for the limiting EAF locations listed in LRA Table 4.3.1-2. 2. Clarify whether the applicant eliminated certain EAF locations based on the more limiting EAF locations fabricated with a different material. If so, describe the eliminated EAF locations and discuss how the applicant determined the more limiting nature of the EAF locations fabricated with a different material (e.g., comparisons of F_{en} and CUF_{en} values).

5	4.3.2	4.3-13	LRA Section 4.3.2 addresses the EAF TLAA for Class 1 piping systems. The 60-year projected CUF_{en} values for the limiting (bounding) EAF locations are described in LRA Table 4.3.1-2. However, LRA Table 4.3.1-2 does not describe the specific piping systems or components (.g., reactor vessel) of the limiting EAF locations.	1. Describe the specific piping systems or components (e.g., reactor vessel) of the limiting EAF locations in LRA Table 4.3.1-2.

LRA Section 4.3.3, "ASME Section III, Class 1 Components"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.3	4.3-16	LRA Section 4.3.3 addresses the fatigue TLAAs for the ASME Code Section III, Class 1 components. Specifically, the LRA section discusses the fatigue analyses for the following piping systems and components: (1) main steam system; (2) main steam isolation valves; (3) safety and relief valves; (4) recirculation system; (5) recirculation system flow control valves; (6) recirculation system gate valves; (7) recirculation system pumps; and (8) control rod drives. The applicant dispositioned the fatigue TLAAs for the main steam system and recirculation system in accordance with 10 CFR 54.21(c)(1)(iii). The applicant dispositioned the fatigue TLAAs for the values, pumps and control rod drives discussed above in accordance with 10 CFR 54.21(c)(1)(i). In comparison, LRA Section 4.3.2.1 addresses the fatigue analyses for the ASME Code Section III, Class 1 reactor pressure vessel and piping components. The applicant dispositioned these fatigue TLAAs in accordance with 10 CFR 54.21(c)(1)(iii). However, it is not clear to the staff whether some of the Class 1 piping systems and components are addressed in both of the LRA sections (i.e., LRA Sections 4.3.3 and 4.3.2.1).	1. Clarify whether some of the Class 1 piping systems and components are addressed in both of LRA Sections 4.3.3 and 4.3.2.1. If so, describe those components and piping systems addressed in both of LRA Sections 4.3.3 and 4.3.2.1. 2. Clarify whether all the piping systems and components addressed in LRA Section 4.3.3 are evaluated in the EAF analysis in LRA Section 4.3.2.2. If not, describe the piping systems and components that are not evaluated in the EAF analysis and the technical basis for why the piping systems and components are not evaluated in the EAF analysis (LRA Section 4.3.2.2). 3. Discuss the results of the EAF analysis for the components dispositioned in accordance with 10 CFR 54.21(c)(1)(i) in LRA Section 4.3.3. If these components are bounded by other component locations in terms of EAF, discuss the bounding component locations and their 60-year projected CUF_{en} values.

			In addition, the staff needs clarification on whether all the piping systems and components addressed in LRA Section 4.3.3 are evaluated in the EAF analysis in LRA Section 4.3.2.2.	
2	4.3.3	4.3-19 4.3-21 4.3-25 4.3-27	LRA Section 4.3.3 indicates that the “small temperature changes of 50°F between 70°F and 552°F (step change)” transient is evaluated in the existing 40-year fatigue analysis for the main steam isolation valves. The LRA also indicates that the “small temperature changes of 50°F between 70°F and 552°F” transient is evaluated in the existing 40-year fatigue analyses for the following components: (1) safety/relief valve; (2) recirculation flow control valves; and (3) recirculation gate valve (LRA Sections 4.3.3.3, 4.3.3.5 and 4.3.3.6). The LRA section also explains that, for each of these transients, the number of cycles evaluated in the existing fatigue analyses is 200 cycles. However, the LRA does not clearly discuss the 60-year projected cycles of these transients.	1. Describe the 60-year projected cycles of the “small temperature changes of 50°F between 70°F and 552°F (step change)” transient and “small temperature changes of 50°F between 70°F and 552°F” transient, respectively, which are discussed in the issue section. As part of the discussion, describe the technical basis of the 60-year cycle projections.
3	4.3.3	4.3-16	LRA Section 4.3.3.8 addresses the fatigue TLAA for control rod drives. The LRA section indicates that the contribution of the assumed 300 cycles (occurrences) of “operational scrams” resulted in a CUF value of 0.2 on the most limiting Class 1 control rode drive subcomponent (lower piston tube threads). The LRA section also explains that the comparison of the assumed 300 “operational scram” cycles to LRA Table 4.3.1-1 shows that	1. Describe which transients in LRA Table 4.3.1-1 were used in the determination of 91 scrams for 60-year cycle projections. As part of the discussion, clarify the 60-year projected cycles of the transients used in the determination of the 91 scrams.

			the plant should only experience 91 scrams in 60 years of operation. However, LRA Section 4.3.3.8 does not clearly describe which transients in LRA Table 4.3.1-1 were used in the determination of 91 scrams for 60-year cycle projections.	

<u>LRA Section 4.3.4, "ASME Section III, Class 1 Fatigue Exemptions"</u>

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.4	4.3-16	LRA Section 4.3.4 addresses the fatigue exemption (waiver) TLAAs for the ASME Code Section III, Class 1 components. The LRA indicates that the exemption analyses are based on the 60-projected cycles of the design transients described in LRA Table 4.3.1-1. Specifically, LRA Table 4.3.4-2 indicates that, with respect to the provision of ASME Code Section III, NB-3222.4(d)(1), the number of pressure cycles from atmospheric to operating conditions and back is based on 101 cycles of the "startup" transient and 44 cycles of the "hydro test" transient, which are total 145 cycles. In contrast, LRA Table 4.3.4-2 indicates that the number of pressure cycles evaluated in the fatigue exemption analyses in relation to NB-3222.4(d)(1) is 144 cycles, which is slightly less than 145 cycles (i.e., 60-year projected cycles). Therefore, the staff needs clarification on the following items: (1) why the evaluated number of pressure cycles (144 cycles) is less than the pressure cycles based on the 60-year projected cycles (i.e., 145 cycles); (2) whether the 145 pressure cycles do not affect the validity of the fatigue exemption analyses; and (3) if the number of actual pressure cycles or other cycles evaluated in the fatigue exemption	1. Clarify the following items: (1) why the evaluated number of pressure cycles (144 cycles) is less than the pressure cycles based on the 60-year projected cycles (i.e., 145 cycles); (2) whether the 145 pressure cycles do not affect the validity of the fatigue exemption analyses; and (3) if actual pressure cycles or other cycles used in the fatigue exemption analyses exceed the evaluated cycles, whether the applicant will take a corrective action to confirm that the fatigue exemption analyses remain valid during the period of extended operation.

			analyses exceed the evaluated pressure cycles (144 cycles), whether the applicant will take a corrective action to confirm that the fatigue exemption analyses remain valid during the period of extended operation.	
2	4.3.4	4.3-35	LRA Section 4.3.4 addresses the fatigue exemption (waiver) TLAAs for the ASME Code Section III, Class 1 components. The LRA indicates that the exemption analyses are based on the 60-projected cycles of the design transients described in LRA Table 4.3.1-1. Specifically, LRA Table 4.3.4-2 indicates that, with respect to the provision of ASME Code Section III, NB-3222.4(d)(6) regarding the evaluation of significant load fluctuations, the applicant assumed 1E6, 1E6 and 10 cycles of the significant load fluctuations for the top head nozzle, jet pump Instrumentation penetration seal and intermediate range monitor/source range monitor (IRM/SRM) dry tubes, respectively. However, LRA Section 4.3.4 does not clearly discuss the 60-year projected transient cycles or other technical basis that the applicant used to determine the assumed cycles of the significant load fluctuations per NB-3222.4(d)(6). In addition, LRA Table 4.3.4-2 does not address the evaluation results related to the criterion in NB-3222.4(d)(6) for the following components: (1) in-core housing; (2) control rod drive (CRD) housing; (3) CRD housing flange; and (4) power range detector dry tubes.	1. Clarify the 60-year projected transient cycles and other technical basis that the applicant used to determine the assumed cycles of the significant load fluctuations per NB-3222.4(d)(6) (i.e., 1E6, 1E6 and 10 cycles of the significant load fluctuations for the top head nozzle, jet pump Instrumentation penetration seal and IRM/SRM dry tubes, respectively). As part of the discussion, discuss the assumptions related to transients and cycles used in the determination of the cycles of significant load fluctuations. 2. Provide justification for why LRA Table 4.3.4-2 does not address the evaluation results related to the criterion in NB-3222.4(d)(6) for the following components: (1) in-core housing; (2) control rod drive (CRD) housing; (3) CRD housing flange; and (4) power range detector dry tubes. If justification cannot be provided, discuss a plan to revise LRA Table 4.3.4-2 as needed.

3	4.3.4	4.3-35	LRA Section 4.3.4 addresses the fatigue exemption (waiver) TLAAs for the ASME Code Section III, Class 1 components. Specifically, the LRA section describes the fatigue exemption analyses for the following components: (1) top head nozzle; (2) in-core housing; (3) jet pump instrumentation penetration seal; (4) control rod drive (CRD) housing; (5) CRDH [CRD housing] flange; (6) power range detector dry tubes; and (7) intermediate range monitor/source range monitor (IRM/SRM) dry tubes. LRA Table 4.3.4-2 describes the results of the fatigue exemption analyses for these components. However, the staff noted that some of the components subject to the fatigue exemption analyses are not clearly discussed in LRA Table 4.3.4-2 as described below. With respect to the criterion in NB-3222.4(d)(4) regarding significant temperature fluctuations, LRA Table 4.3.4-2 indicates that the evaluation related to the criterion is not applicable to (1) the power range detector dry tubes and (2) IRM/SRM dry tubes. However, LRA Table 4.3.4-2 does not clearly describe why the criterion in NB-3222.4(d)(4) is not applicable to these components.	1. With respect to the criterion in NB-3222.4(d)(4) regarding significant temperature fluctuations, clarify why the evaluation related to the criterion is not applicable to (1) the power range detector dry tubes and (2) IRM/SRM dry tubes. 2. With respect to the criterion in NB-3222.4(d)(5) regarding the temperature difference between dissimilar materials, clarify why the evaluation related to the criterion is not applicable to the CRD housing. In addition, clarify why LRA Table 4.3.4-2 does not address the following components in relation to the criterion in NB-3222.4(d)(5): (1) top head nozzle; (2) jet pump instrumentation penetration seal; (3) CRD housing flange; (4) power range detector dry tubes; and (5) IRM/SRM dry tubes.

			With respect to the criterion in NB-3222.4(d)(5) regarding the temperature difference between dissimilar materials, LRA Table 4.3.4-2 indicates that the evaluation related to the criterion is not applicable to the CRD housing. In addition, LRA Table 4.3.4-2 does not address the following components in relation to the criterion in NB-3222.4(d)(5): (1) top head nozzle; (2) jet pump instrumentation penetration seal; (3) CRD housing flange; (4) power range detector dry tubes; and (5) IRM/SRM dry tubes.	

Clinton Power Station
License Renewal Application (LRA) Breakout Audit Questions

LRA Section 4.3.5, "ASME Section III, Class 2, Class 3, and ANSI B31.1 Allowable Stress Analyses and Related HELB Selection Analyses"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.5	4.3-39	LRA Section 4.3.5 addresses the allowable stress and related high-energy line break (HELB) TLAAs for the piping systems designed in accordance with ASME Section III, Class 2, Class 3, and ANSI B31.1 design rules. LRA Table 4.3.5-2 describes the number of 60-year projected cycles for each non-Class 1 piping system to confirm that the 60-year projected cycles do not exceed 7000 cycles in the implicit fatigue analysis. However, LRA Section 4.3.5 does not clearly describe how the 60-year cycles were determined (e.g., based on piping system design information, plant operation procedures, test requirements, USAR information and specific system-level knowledge).	1. Clarify how the applicant estimated the 60-year cycles for the non-Class 1 piping systems (e.g., based on piping system design information, plant operation procedures, test requirements, USAR information and specific system-level knowledge).

LRA Section 4.3.7, "Reactor Vessel Internals"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.7	4.3-44 4.3-45	LRA Section 4.3.7 addresses the fatigue TLAAs for the reactor vessel internal (RVI) components. In comparison, the following reference indicates that the feedwater sparger header pipe/end plate weld has an existing fatigue analysis and that the 40-year cumulative usage factor (CUF) for the component is less than 1.0 (Reference: EPU-T0303-02, "Extended Power Uprate: Task T0303-02, RPV Internals Structural Integrity Evaluation Non-Core Support Structure Components," Section 3.3.1, Revision 2). However, LRA Section 4.3.7 does not identify the fatigue analysis for the feedwater sparger header pipe/end plate weld as a TLAA. The staff needs clarification on why the LRA does not identify the fatigue analysis for the feedwater sparger header pipe/end plate weld as a TLAA. If the fatigue analysis needs to be identified as a TLAA, the staff needs the information on the disposition of the TLAA and its basis.	1. Provide justification for why LRA Section 4.3.7 does not identify the fatigue analysis for the feedwater sparger header pipe/end plate weld as a TLAA. If such justification cannot be provided, revise the LRA to identify the fatigue analysis as a TLAA and to provide the TLAA disposition and its technical basis. 2. If the fatigue TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(i) or (ii), describe the following information: (1) the transient cycles evaluated in the fatigue analysis and the corresponding 60-year projected cycles to confirm that the evaluated cycles are bounding for the 60-years of operation; and (2) the estimated CUF value in the fatigue TLAA. 3. If the fatigue TLAA is dispositioned in accordance with 10 CFR 54.21(c)(1)(iii), describe the 60-year projected CUF for the feedwater sparger header pipe/end plate weld to confirm the effectiveness of the fatigue monitoring and timeliness of corrective actions.

2	4.3.7	4.3-46	LRA Section 4.3.7 addresses the fatigue TLAAs for the RVI components. Specifically, the applicant dispositioned the fatigue TLAAs for the core plate stiffener to skirt weld and top guide/grid components in accordance with 10 CFR 54.21(c)(1)(i). However, the LRA does not describe the transient cycles evaluated in the existing fatigue analyses and the 60-year projected cycles of the transients to demonstrate that the transient cycles evaluated in the existing fatigue analysis are bounding for the 60-year projected cycles.	1. For the core plate stiffener to skirt weld and top guide/grid components dispositioned in accordance with 10 CFR 54.21(c)(1)(i), describe the transient cycles evaluated in the existing fatigue analysis and the 60-year projected cycles of the transients to demonstrate that the transient cycles evaluated in the existing fatigue analysis are bounding for the 60-year projected cycles.

3	4.3.7	4.3-46	LRA Section 4.3.7 addresses the fatigue TLAAs for the RVI components. Specifically, the applicant dispositioned the fatigue TLAAs for the core shroud support structure and core shroud stabilizer assembly in accordance with 10 CFR 54.21(c)(1)(ii). The LRA explains that the 40-year CUF for the core shroud support plate, which is the limiting location for the core shroud support structure and core shroud stabilizer assembly, is 0.426. The LRA indicates that the CUF value is based on safety relief valve (SRV) actuation transient cycles, which are greater than 12000 cycles in the 40-yearfatigue analysis. The LRA also explains that the SRV actuation transient is the most significant contributor to the fatigue in the core shroud support plate. However, the following reference indicates that the most significant contribution to the 40-year CUF is due to thermal cycles (i.e., contribution of 0.406 due to certain thermal cycles) (Reference: GE-NE-26A-6217, "Shroud and Shroud Support Structure," Section 6.2.5.2, Revision 9, March 9, 2005). The reference also indicates that the calculation of the CUF contribution (0.406) is based on the maximum usage factor in the shroud support plate for a similar standard BWR/6 plant. The reference further explains that the 40-year CUF contribution of the SRV actuation cycles to the core shroud support plate is approximately	1. Given the maximum CUF contribution due to thermal cycles (non-SRV-actuation cycles) for the core shroud support plate discussed in the reference in the issue section, clarify whether the SRV actuation transient is the most significant contributor to the 40-year CUF of the core shroud support plate. If not, describe the following information: (1) the transients and 40-year cycles that make the most significant contribution to the CUF and (2) the most significant contribution to the CUF (i.e., the partial CUF due to these transient cycles). 2. In addition, clarify whether the transient cycles, which make the most significant CUF contribution to the core shroud support plate, reasonably represent the 40-year cycles of the Clinton Power Station in terms of the fatigue analysis for the core shroud support plate. 3. Revise the LRA as needed based on the discussion above.

			0.013 and the 40-year CUF contribution of other thermal transients is less than 0.01. However, the LRA does not clearly discuss the following items related to the maximum CUF contribution (0.406) due to certain thermal cycles: (1) specific thermal transients and their cycles evaluated in the CUF calculation for a standard BWR/6 plant; (2) whether the transient cycles evaluated for the standard plant reasonably represent the 40-year transient cycles of the Clinton Power Station.	
4	4.3.7	4.3-46	LRA Section 4.3.7.2 addresses the ASME Section III, Class CS fatigue exemptions for the RVI components. LRA Table 4.3.7.2-1 indicates that, with respect to the criterion in NG-3222.4(d)(4) of ASME Code Section III regarding significant mechanical load fluctuations, the number of transients (events) assumed in the 60-year fatigue exemption analysis is zero. The staff needs clarification on why the number of the evaluated transient cycles is zero.	1. Explain why the number of transients assumed in the 60-year fatigue exemption analysis regarding the significant mechanical load fluctuations is zero. As part of the discussion, clarify whether there is no significant mechanical load fluctuations in the fatigue exemption analysis.

5	4.3.7	4.3-7	LRA Section 4.3.7.2 addresses the ASME Section III, Class CS fatigue exemptions for the RVI components. LRA Table 4.3.7.2-1 indicates that, with respect to the criterion in NG-3222.4(d)(3) regarding the dissimilar materials, the evaluation related to the criterion is not applicable to the RVI components subject to the fatigue exemption analyses. However, the LRA does not clearly discuss why the evaluation related to the criterion in NG-3222.4(d)(3) is not applicable to the RVI components.	1. With respect to the criterion in NG-3222.4(d)(3), clarify why the evaluation related to the criterion is not applicable to the RVI components.

LRA Section 4.7.5, "Hydraulic Control Units"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.7.5	4.7-9	LRA Section 4.7.5 addresses the fatigue TLAA for hydraulic control units (HCUs). The LRA section indicates that the accumulator and nitrogen tanks of the hydraulic control units meet the requirements of ASME Code Section VIII. However, the LRA does not clearly discuss whether there is an existing fatigue analysis for the accumulator and nitrogen tank that needs to be identified as a fatigue TLAA.	1. Clarify whether there is an existing fatigue analysis for the accumulator and nitrogen tanks that was designed in the requirements of ASME Code Section VIII. If so, discuss the disposition of the fatigue analysis and its basis and a potential need to revise the LRA accordingly.
2	4.7.5	4.7-9	LRA Section 4.7.5 addresses the fatigue TLAA for hydraulic control units (HCUs). The LRA indicates that these components are qualified to 7000 cycles in which the components are heated and pressurized to the design temperature and pressure. The LRA also explains that the USAR Section 3.9.1.1.3, "Hydraulic Control Unit Transients," documents the transients and transient occurrences that were considered in the design of the HCUs and the total number of startup, shutdown, and scram transient occurrences documented in the USAR section are significantly less than 7,000 thermal and pressure cycles (occurrences). The staff noted that USAR Section 3.9.1.1.3 indicates that the following design cycles related to scrams were evaluated in the existing fatigue	1. Describe the 60-year projected cycles of the following scram-related transients to confirm that the 60-year projected cycles are bounding for (greater than) the cycles evaluated in the existing fatigue analysis for the HCUs: (1) "scram test" transient; (2) "startup scram" transient; and (3) "operational scram" transient. As part of the discussion, explain the basis of these cycle projections. 2. Describe the 60-year projected cycles of the SRV actuations to confirm that the projected cycles are bounding for (greater than) the SRV actuation cycles (i.e., 1800 cycles) evaluated in the fatigue analysis for the effect of seismic and hydrodynamic loads on the hydraulic control units. As part of the discussion, explain the basis of the cycle projection.

			analysis for the HCUs: (1) 140 cycles of the “scram test” transient; (2) 160 cycles of “startup scram” transient; and (3) 300 cycles of “operational scram” transient. However, LRA Section 4.7.5 does not clearly describe the 60-year projected cycles for these scram transients compared to the transient cycles evaluated in the existing fatigue analysis. In addition, LRA Section 4.7.5 indicates that USAR Section 3.9.2.2.1.6.4 “Hydraulic Control Unit (HCU),” documents that the HCUs were analyzed for faulted conditions including the effects of seismic and hydrodynamic loads. The LRA explains that this design adequacy was determined by testing and analysis and that the qualification testing included vibration testing equivalent to 1800 safety relief valve (SRV) actuations, one operational basis earthquake (OBE), and one safety shutdown earthquake (SSE). However, LRA Section 4.7.5 does not clearly describe the 60-year projected cycles (occurrences) of the SRV actuations.	

LRA Section 4.7.8, "Fuel Pool Cleanup System, Flow Control Valves"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.7.8	4.7-13	LRA Section 4.7.8 addresses the fatigue TLAA for the flow control valves of the fuel pool cleanup system. The LRA section indicates that the flow control valves (1FC004A and B) regulate flow through the system demineralizers. LRA Section 4.7.8 also explains that these valves are ASME Code Class 3 components, but an existing design analysis evaluated these valves for fatigue. However, the LRA section does not clearly discuss whether the fatigue analysis involving the cumulative usage factor (CUF) calculations was performed in accordance with the fatigue analysis provisions of ASME Code Section III for Class 1 components.	1. Clarify whether the fatigue analysis involving the CUF factor calculations was performed in accordance with the fatigue analysis provisions of ASME Code Section III for Class 1 components. If not, describe the standard or approach that the applicant used in the CUF calculations for the Class 3 valves.
2	4.7.8	4.7-13	LRA Section 4.7.8 addresses the fatigue TLAA for the flow control valves of the fuel pool cleanup system. The fatigue evaluation in the analysis assumed the following transient cycles (occurrences): (1) 87600 cycles of operational loads; (2) 14790 cycles of safety relive valve (SRV) lifts; (3) 5 cycles of operational basis earthquake (OBE); and (4) one cycles of safe shutdown earthquake (SSE).	1. Given the apparent inconsistency of the operational loading cycles between LRA Section 4.7.8 and the reference document in the issue section (i.e., 87600 and 76990 cycles), clarify the cycles of operational loading evaluated in the fatigue analysis for the flow control valves. If the correct number of the projected cycles is different from 87600, discuss the technical basis of the cycle projection and a potential need to revise LRA Sections 4.7.8 and A.4.7.8 (USAR supplement) accordingly.

			However, the following reference indicates that 76990 cycles of operational loads (loading) were evaluated in the fatigue analysis for the valves (Reference: Calculation CQD-025544, "Fatigue Analysis of Valve Nos. 1FC004A, B," Revision 0, November 18, 1985, PDF file page 39 of 42). The reference also indicates that the cumulative usage factor associated with the 76990 cycles of operational loading is 0.077. Given the apparent inconsistency of the operational loading cycles between the LRA section and the reference document (i.e., 87600 and 76990 cycles), the staff needs clarification on the cycles of operational loading evaluated in the fatigue analysis for the flow control valves. In addition, LRA Section 4.7.8 indicates that LRA Table 4.3.1-1 documents 60-year cycle projections for SRV lift, OBE, and SSE transients. However, the LRA section does not clearly describe which specific transients in LRA Table 4.3.1-1 correspond to the SRV lift transient evaluated in LRA Section 4.7.8.	2. Describe which specific transients in LRA Table 4.3.1-1 correspond to the SRV lift transient evaluated in LRA Section 4.7.8 to confirm that the SRV lift cycles evaluated in the valve fatigue analysis are bounding for the relevant 60-year projected cycles.
3	4.7.8	4.7-13	LRA Section 4.7.8 addresses the fatigue TLAA for the flow control valves of the fuel pool cleanup system. With respect to the cycle projections of the operational loading of the valves, the applicant indicated that, when these diaphragm valves are in service the valve position will only slightly modulate to maintain flow to the system demineralizer. The applicant also explained that resulting stresses on valve elements are	1. Clarify the following items: (1) how the applicant determined the 60-year bounding projected cycles (i.e., 65700 cycles) that contribute to fatigue in relation to the valve operational loading; and (2) whether the 65700 cycles are already included in the 87600 cycles of operational loading discussed in LRA Section 4.7.8 and, if not, the contribution of the 65700 cycles to the cumulative usage factor of the flow control valves.

			minor and would not contribute to fatigue. The applicant further explained that larger operating stresses will result when the valve experiences a significant position change (e.g., the valve is placed in and out of service), the control band is significantly changed, or the demineralizer pressure drop increases or decreases. In addition, the applicant stated that these events occur significantly less than six times a day (6 x 365 x 60 = 131400) and that this conservative assessment indicates no more than 65700 cycle occurrences would result in 60 years. However, LRA Section 4.7.8 does not clearly describe the following items: (1) how the applicant determined the 60-year bounding projected cycles (i.e., 65700 cycles) that contribute to fatigue in relation to the valve operational loading; and (2) whether the 65700 cycles are already included in the 87600 cycles of operational loading discussed in LRA Section 4.7.8 and, if not, the contribution of the 65700 cycles to the cumulative usage factor of the flow control valves.	

LRA Section TLAA 4.7.4, Reactor Shield Wall Fluence

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.7.4	4.7-8	In Application: Section 4.7.4, " Reactor Shield Wall Fluence," the applicant states a fluence threshold of $10x10^{22}$ n/cm^2 for radiation damage to the reactor shield wall steel liner. The application concludes that further structural analysis is not required because the calculated neutron fluence is below the aforementioned threshold. NRC guidance states that the radiation damage threshold for ferritic materials, such as the reactor pressure vessel, is $1x10^{17}$ n/cm^2 as specified in 10 CFR 50, Appendix H, which is different from the applicant's threshold. The USAR 3.8.3.6 states a damage threshold of "10^{22} nvt", which the staff noted is equivalent to $1x10^{22}$ n/cm^2. However, USAR 3.8.3.6 does not cite a source for $1x10^{22}$ n/cm^2. The staff noted $1x10^{22}$ n/cm^2 is typically the fluence experienced in fuel cladding, not for reactor shield wall steel liner.	Provide the basis for the $10x10^{22}$ n/cm^2 radiation damage threshold.
2	4.7.4	4.7-8	The general arrangement drawings (Item 38 in the document request spreadsheet) show the reactor pressure vessel in relation to the reactor shield wall.	Confirm that there are no lateral supports that connect the reactor pressure vessel to the reactor shield wall and provide annular gap distance between the reactor pressure vessel and the reactor shield wall.

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LRA Section /TLAA: 4.2.2: Reactor Pressure Vessel Upper-Shelf Energy (USE) Analyses, 4.2.3: Reactor Pressure Vessel Adjusted Reference Temperature (ART) Analyses

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.2.3	4.2-32	LRA Table 4.2.3-1 Section: CPS Shell 2 Plates: Extended Beltline I.D. PC Mark 22-4, has Heat No. C43203-2. LRA Table 4.2.2-1 Section: CPS Shell 2 Plates, Component PC Mark 22-4, has Heat Number C4320-2. Clinton FSAR Table 5.3-1 also indicates the Heat No. as C-4320-2.	Address the inconsistency between Heat Nos. C43203-2 and C4320-2 and confirm if Heat No. C43203-2 in LRA Table 4.2.3-1 is a misprint.
2	4.2.3	4.2-32	LRA Table 4.2.3-1 Section: CPS Shell 3 Plates: PC Mark 23-1-1 (Heat No. C4209-1), PC Mark 23-1-2 (Heat No. C4212-1) and PC Mark 23-1-3 (Heat No. C4245-1) appear to have a measured initial RTndt value.	Provide documentation (e.g., CMTRs, other fabrication records from OEM/manufacturer, technical reports, etc) to justify the %Cu, %Ni, and initial USE values for the initial RTndt value.
3	4.2.3	4.2-38	LRA Table 4.2.3-3 Section CPS Extended Beltline Nozzle Forgings: includes multiple RPV materials related to Extended Beltline I.D. of N1, N2, and N6. These RPV materials appear to have a measured initial RTndt value.	Provide documentation (e.g., CMTRs, other fabrication records from OEM/manufacturer, technical reports, etc) to justify the %Cu, %Ni, and initial USE values for the initial RTndt value. Explain the difference/discrepancy in initial RTndt values provided in the LRA and the value provided in GE Report, GE-NE-B13-02084-00-01 (ML003745310).

4	4.2.3	4.2-32	LRA Tables 4.2.3-1 through 4.2.3-4, RPV materials with Heat No. 5P6756 – in all instances where material chemistry values were provided, the %Cu (i.e., 0.08) is consistent with the information in Clinton FSAR Section 5. LRA Tables 4.2.3-1 through 4.2.3-4, RPV materials with Heat No. 5P6756 – in all instances where material chemistry values were provided, the %Ni is inconsistent with the information in Clinton FSAR, Section 5 (i.e., FSAR Tables 5.3-1 and 5.3-2).	Provide basis for the %Ni discrepancy and documentation support %Ni of 0.96 as indicated in LRA Section 4.2.3.

5	4.2.3	4.2-39	LRA Table 4.2.3-4 Sections (1) CPS Extended Beltline Nozzle Welds N1 and N2 and (2) CPS Extended Beltline Nozzle Welds N6: Heat No. 3P4955/3478 (Single) and Heat No. 3P4955/3478 (Tandem) has RPV material properties. By letter dated August 25, 2000 (ML003745306), the licensee submitted an Exemption Request and Proposed Amendment to Facility Operating License No. NPF-62 (LA-00-011) for Clinton Power Station. As part of this licensing action, GE Report dated August 31, 2000 (ML003745310): GE-NE-B13-02084-00-01 Revision 0 Class 3 was provided to the NRC staff in support of the licensing action. The information contained in the GE Report mentioned above indicates two separate results for the chemical analyses performed on weld wire Heat No. 3P4955 - Flux Lot# 3478. The information presented in LRA Table 4.2.3-4 for Heat Nos. 3P4955/3478 (Single) and 3P4955/3478 (Tandem) does not appear to have considered the two sets of results from the GE Report nor taken the conservative (i.e., higher) values from the two sets of results.	Explain the rationale for the %Cu, %Ni, and initial RTndt values in LRA Table 4.2.3-4 for weld wire Heat No. 3P4955 - Flux Lot# 3478 considering the two separate results for the chemical analyses. Provide any relevant documentation (e.g., CMTRs, other fabrication records from OEM/manufacturer, technical reports, etc) that justify the %Cu. %Ni, and initial RTndt.
6	4.2.2	4.2-18	LRA Table 4.2.2-2 Component ID Sections (1) Weld Between Shell 1 and 2 and (2) Weld Between Shell 2 and 3: Heat No. 422P5621/L414B27AD indicates an initial USE (i.e., 133 ft-lbs) that is inconsistent with information presented in Clinton FSAR, Section 5 (see FSAR TABLE 5.3-1 – sheet 3 of 4)	Provide basis for the discrepancy and documentation supporting initial USE value as indicated in LRA Section 4.2.2.

7	4.2.2	4.2-18	LRA Table 4.2.2-1 Component ID "PC Mark 22-4" – Heat No. C4320-2 indicates an initial USE (i.e., 105 ft-lbs) that is inconsistent with information presented in Clinton FSAR, Section 5 (see FSAR TABLE 5.3-1 – sheet 2 of 4)	Provide basis for the discrepancy and documentation supporting initial USE value as indicated in LRA Section 4.2.2.
8	4.2.2	4.2-29	LRA Table 4.2.2-7 CPS Equivalent Margin Analysis for 52 EFPY Limiting Extended Beltline Shell 3 Plates concludes at the bottom of the table, "Therefore, vessel *welds* are bounded by Equivalent Margin Analysis".	Address the inconsistency in the conclusion of LRA Table 4.2.2-7 as it mentioned welds.

LRA Section 4.3.1, "Transient Cycle and Cumulative Usage Projections for 60 Years"

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.1, Table 4.3.1-1	4.3-2	LRA Table 4.3.1-1 describes the design transients and 60-year projected cycles for fatigue analyses. LRA Section 4.3.1 explains that, since most nuclear power stations, including Clinton Power Station (CPS), have experienced a significant declining trend in accumulation of transients over time, transient projections based on recent operating experience provides an accurate basis for future projections. The LRA also indicates that, therefore, the extrapolated rates for transients with current occurrences were weighted (by 75 percent) with the recent 10-year occurrence rate rather than the overall occurrence rate. However, the staff needs clarification on the meaning of weighting by 75 percent for the most recent 10-year cycles (up to September 30, 2022). Specifically, the staff needs clarification on the specific weighting factors for the following cycle accumulation rates used in the 60-year cycle projections: (1) a long-term rate of accumulation based on the entire history (i.e., the number of cycles since the start of the plant operation up to September 30, 2022); and (2) a short-term rate of accumulation (i.e., the incremental cycles over the most recent 10 years up to September 30, 2022).	1. Clarify the specific weighting factors for the following cycle accumulation rates used in the 60-year cycle projections: (1) a long-term rate of accumulation based on the entire history (i.e., the number of cycles since the start of the plant operation up to September 30, 2022); and (2) a short-term rate of accumulation (i.e., the incremental cycles over the most recent 10 years up to September 30, 2022). 2. Discuss the basis of the specific weighting factors for cycle accumulation rates used in the cycle projections.

			In addition, the staff needs clarification on the basis of the specific weighting factors for cycle accumulation rates used in the cycle projections.	
2	4.3.1	4.3-4	LRA Table 4.3.1-1 indicates that the number of the 60-year projected occurrences (cycles) of the “design hydrostatic test” transient is 44, which is greater than the design transient occurrences (cycles) of 40. Similarly, LRA Table 4.3.1-1 indicates that, for the “turbine roll” transient and “HOTZERO – Hot Zero Power Scram” transient, the number of 60-year projected cycles exceed the number of design transient cycles. In comparison, the applicant dispositioned the fatigue TLAAs for the following components in accordance with 10 CFR 54.21(c)(1)(i): main steam isolation valves; (2) safety/relief valves; (3) recirculation system flow control valves; (4) recirculation system gate valves; (5) recirculation system pumps; (6) control rod drives; and (7) core plate stiffener to skirt weld and top guide/grid reactor vessel internal components. Given the TLAA disposition for the components discussed above in accordance with 10 CFR 54.21(c)(1)(i) (i.e., not using cycle projections or the Fatigue Monitoring AMP), the staff needs clarification on whether the 60-year projected cycles of the “design hydrostatic test” transient, “turbine roll” transient and “HOTZERO	1. Given the TLAA disposition for the components discussed above in accordance with 10 CFR 54.21(c)(1)(i) (i.e., not using cycle projections or the Fatigue Monitoring AMP), the staff needs clarification on whether the 60-year projected cycles of the “design hydrostatic test” transient, “turbine roll” transient and “HOTZERO – Hot Zero Power Scram” transient, which are greater than the design cycles, may affect the validity of the fatigue TLAA disposition (e.g., resulting in the 60-year CUF values of these components exceeding the design limit).

			– Hot Zero Power Scram" transient, which are greater than the design cycles, may affect the validity of the fatigue TLAA disposition (e.g., resulting in the 60-year CUF values of these components exceeding the design limit).	
3	4.3.1	4.3-4	As discussed in Question 2 above, LRA Table 4.3.1-1 indicates that the 60-year projected cycles of the "design hydrostatic test" transient, "turbine roll" transient and "HOTZERO – Hot Zero Power Scram" transient are greater than the design cycles. In comparison, LRA Section 4.3 and its subsections address the fatigue TLAAs for ASME Code Class 1 components and piping and the reactor vessel internal components. Some of the fatigue TLAAs are dispositioned in accordance with 10 CFR 54.21(c)(1)(iii) using the Fatigue Monitoring AMP to ensure that the CUF and CUF_{en} values do not exceed the fatigue design limit for the period of extended operation. The staff needs clarification on whether the 60-projected cycles, which exceed the design cycles for the fatigue analyses in LRA Section 4.3 and its subsections, can increase the 60-year projected CUF and CUF_{en} values above 1.0 in such a manner to affect the effectiveness of the Fatigue Monitoring AMP and the timeliness of corrective actions of the AMP.	1. In relation to the fatigue TLAAs dispositioned per 10 CFR 54.21(c)(1)(iii), clarify whether the 60-year projected cycles, which exceed the design cycles, increase the 60-year projected CUF and CUF_{en} values of the components and piping above 1.0 in such a manner to affect the effectiveness of the Fatigue Monitoring AMP and the timeliness of corrective actions. If not, provide the technical basis of the applicant's determination. If so, identify the affected components, their 60-year projected CUF and CUF_{en} values and any additional activities needed to enhance the fatigue monitoring and aging management for the affected components.

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LRA Scoping and Screening Section: 2.3.3.9, Fire Protection System

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	Section 2.3.3.9	2.3-72	Table 2.3.3.9 of the LRA does not include the following fire protection components in the scope of license renewal and subject to an aging management review (AMR): • Halon bottles. • Pump casing (electric pump). • Passive components in diesel-driven fire pump engine, heat exchanger channel, shell, tube, and jacket water. • Filter housing • Fire wrap/electric raceway fire barrier. • Radiant heat shield. • Passive components in incipient fire detection system. • Sandpipe risers. • Seismic support for standpipes system piping. • Intake traveling screen/trash rack. • Floor drains for firefighting water. • Station transformer fire suppression system and components.	Verify whether the fire protection components listed are within the scope of LRA in accordance with 10 CFR 54.4(a) and whether they are subject to an AMR in accordance with 10 CFR 54.21(a)(1). If any of the listed components are not within the scope of LRA and are not subject to an AMR, the staff requests that the applicant provide justification for the exclusion.
2	2.3.3.9	LR-CPS-M05-1039, Sheet 6	This boundary drawing shows the following fire protection systems/components as not within the scope of license renewal (i.e., not colored in green): • Fire pump • Diesel engine • Flash arrester • Day fuel oil day tank	Verify whether the fire protection systems and components listed are within the scope of license renewal in accordance with 10 CFR 54.4(a) and whether they are subject to an AMR in accordance with 10 CFR 54.21(a)(1). If they are not within the scope of license renewal and are not subject to an AMR, the staff requests that the applicant justify the exclusion.

3	2.3.3.9		The Constellation Energy Generation, LLC (CEG) response to the staff's Clinton Power Station (CPS) license renewal application fire protection breakout session audit question regarding Halon storage bottles states: The halon bottles are in scope for license renewal under 10 CFR 54.4(a)(3), but they are periodically replaced, making them short lived components that are not subject to an AMR in accordance with 10 CFR 54.21(a)(1). The CEG considered the Halon 1301 storage bottles within the scope of license renewal but excluded from the AMR.	The staff requests the applicant to provide the replacement frequency and criteria for the Halon 1301 storage bottles. Do the Halon 1301 storage bottles at CPS have a qualified life, or do they follow a standard regarding conditions for replacement?

LRA Section AMP: B.2.1.37, Insulation Material for Electrical Cables and Connections Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.37	B-160	NUREG 1801-LR XI.E1 Program Description states: Adverse localized environments (ALE) can be identified through the use of an integrated approach. This approach may include, but is not limited to, (a) the review of Environmental Qualification (EQ) zone maps that show radiation levels and temperatures for various plant areas, (b) consultations with plant staff who are cognizant of plant conditions, (c) utilization of infrared thermography to identify hot spots on a real-time basis, and (d) the review of relevant plant-specific and industry operating experience. CPS LRA section B.2.1.37 program description does not include how the ALE will be identified at CPS.	Provide a description of how the ALE will be identified at CPS and include it in B.2.1.37.
2	B.2.1.37	B-161	B.2.1.37 program includes the following examples of operating experience 2. In 2013, cable insulation condition walkdowns were performed in response to Institute of Nuclear Power Operations (INPO) guidance for cable condition monitoring. 3. In 2017, cable insulation condition walkdowns were performed in response to INPO guidance for cable condition monitoring.	Provide the Work order and/or inspection report associated with the above-mentioned examples of operating experience for B.2.1.37.

LRA Section B.2.1.7, BWR Stress Corrosion Cracking

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	LRA Section B.2.1.7	B-35	The LRA section states that BWRVIP-62 is being implemented in its program.	1. Provide the specific version of BWRVIP-62 currently being implemented. 2. Identify if there is any non "-A" BWRVIP guidance currently being implemented in the BWR SCC program. If yes, provide technical basis

LRA Section : B.2.1.39, Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	B.2.1.39	B-166 through B-168	• GALL-LR XI.E3 "Preventive Actions" requires periodic inspection for water accumulation "should occur at least annually." This section further directs "operation of dewatering devices should be inspected, and operation verified prior to any known or predicted heavy rain or flooding events." • Non-safety manholes equipped with solar-powered dewatering and alarm equipment are to be inspected at least annually, however, based on plant-specific OE, inspection for water accumulation may be extended to a longer interval between inspections.	• Clarify if extending non-safety solar-powered manholes inspection frequency beyond yearly would constitute an Exception to GALL-LR if plant-specific OE indicates extending inspection frequency beyond the annual requirement. • Explain whether verification of proper operation of dewatering and alarm equipment is required prior to known or predicted heavy rain or flooding. Commitment 39 commits to performing these verifications, but it is not described in the AMP or Basis document.

2	CL-PBD-AMP-XI.E3, Section 2.1 CPS response Item d)	Page 9 of 48	• The CPS response to Program Description, item 2.1.d) makes a statement of "By definition, non-EQ cables are either not exposed to harsh accident conditions or are not required to remain functional during or following an accident to which they are exposed. The cables in scope of this program are not subject to harsh accident conditions."	• Clarify whether this is an accurate definition of non-EQ cables, and where that definition comes from. Clarify what these two sentences are intending to convey for this section.
3	LRA Commitment Table Item 39	Page A-83	The commitments are detailed to discuss each area of the AMP inspection and testing items. The last sentence states "The cable vaults will be inspected at least annually."	• With the level of detail listed in the commitments, this last statement does not appear to be accurate for what the AMP intends to do for the Safety-Related manhole inspections of once every 5 years. How will this commitment be met, as written, for the safety-related manhole inspections?

LRA Section: B.2.1.41, Electrical Cable Connections Not Subject to 10 CFR 50.49

Environmental Qualification Requirements

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	ER-AA-300-120	Full Document	The document that was uploaded is a Marked-Up version of Revision 5.	When does CPS plan to issue this revision change?
2	B.2.1.41	B-176	This section describes that the technical evaluation of the one-time tests will be completed prior to the period of extended operation. In the applicant SharePoint for Clinton > 03 AMP Information > 41 E6 Cable Connections >	Please clarify whether these 2014 work orders are the data points to be evaluated as part of this AMP's one-time inspection, or if new, more recent (closer to PEO) thermography data points will be taken to evaluate more current conductor conditions as part of the one-time inspection prior to PEO.

			05 Inspection Results, there are 7 work orders dealing with components and thermography, and some work orders dating back as far as 2014.	

Accessible concrete Area

Question Number	**LRA Section**	**LRA Page**	**Background / Issue** **(As applicable/needed)**	**Discussion Question / Request**
1			LRA claims AMR 3.5.1-24 to be consistent with NUREG-1801, however, LRA lacks Table 2 AMR items associated with Table 1 AMR item 3.5.1-24 (GALL item II.B3.2.CP-84) for accessible concreate area.	Provide Table 2 items associated with Table 1 AMR item 3.5.1-24 (GALL item II.B3.2.CP-84).

LRA Section AMP: External Surface Monitoring Program

Question Number	**LRA Section**	**LRA Page**	**Background / Issue** **(As applicable/needed)**	**Discussion Question / Request**
1	3.3.2-9	Page 3.3-158	The LRA states that loss of material for copper alloy with 15% zinc or less piping, piping components exposed externally to outdoor air will be managed by Fire Protection (B.2.1.16).	It is not clear to the staff how the Fire Protection (B.2.1.16) can manage loss of material on copper alloy with 15% zinc or less piping, piping components. Please explain how this program is capable of managing this aging effect or use another program that is capable of inspecting piping, piping components.

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LRA Section AMP: Copper Alloy

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	3.3.2-14	638 in the pdf (3.3-201)	Table 3.3.2-14 lists the AMR item 3.3.1-79 as a Note C,2. Note Cs are for items that have a different component only. This AMR item is listed as having a different component and crediting a different AMP. AMR items that have different components and aging management programs than the GALL are considered Note Es. The GALL states that 3.3.1-79 is applicable for piping, piping components, and piping elements and uses the External Surfaces Monitoring of Mechanical Components as the aging management program. The LRA states that this item is for a heat exchanger and uses Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components. The staff recognizes the plant note explanation; however the current information describes a Note E.	The staff would like to discuss why this AMR item 3.3.1-79 on page 638 is marked as a Note C and not a Note E.

Closed Cycle Cooling

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			Drawing LR-CPS-M05-1032 provides P&ID for the Cooling Water (CC) system which is part of the LRA Closed Cycle Cooling Water System. These drawings show the interfaces between functional and spatial in multiple locations. Some valves at the interfaces are not shown to be within the scope of LRA	1. Drawing LR-CPS-M05-1032 – Confirm interface break at LP drain (Sheet 1, B-3) and where is connector arrow (M05-1032 Sht 3 B-1) shown on referenced drawing. 2. Describe why are valves (such as, Sht 2, C-2 - ICC076B) within Drawing LR-CPS-M05-1032 (Sheet 2) are declared out of scope and not within scope as GREEN. A few similar valves in multiple locations. (ICC075A, ICC075B, ICC076A, ICC076B)

Fuel Pool Cooling

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			Scoping document for Fuel Pool Cooling and Storage System and Structure Report reference boundary drawings LR-CPS-M05-1071 sht 1 & 2.	Staff is unable to locate Fuel Pool Cooling and Storage system interface, component type or function shown on drawings LR-CPS-M05-1071 sht 1 & 2

Traveling Screens

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			Drawing LR-CPS-M05-1051 (Sheet 1) – Drawing shows traveling screens located in primary flowpath for train "A" train diesel driven fire pumps as included in License Renewal (Note 3).	Provide discussion why other travelling screens shown on drawing are omitted from License Renewal.

Shutdown Service Water

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			LRA Section 2.3.3.12 indicates, "The flow path for the shutdown service water cooling water is from the UHS through the bar grills and traveling screens into the shutdown service water pump intake bay."	Please provide reference of drawings showing these traveling screens inclusion in the license renewal.

Flow Accelerated Corrosion and Erosion

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			In addition, ER-AA-340-1001, "GL 89-13 Program Implementation Instructional Guide," Section 4.3.2, "Determine Service Water System Locations Susceptible to Erosion" Part C, states "Selection shall include evaluation of erosion from high flow rates, flow restrictions, and cavitation downstream of throttling valves.	A) Where is the caveat in ER-AA-5400-1001, that the safety factor of 1.1 is only valid for solid particle erosion, and that a minimum 1.5 safety factor should be used where other erosion mechanism are potentially causing wall thinning? B) Did any of the corrosion rate calculations for any of the CRs associated with potential cavitation issues use a safety factor less than 1.5, and if so, provide the technical basis from the calculation that justifies the use of a safety factor less than 1.5?
2				While the wall thinning from solid particle erosion may be linear, does the particle loading in the SX system remain constant or can seasonal changes (e.g., heavy rains, varying levels of sand deposits in the intake bay) result in variation of the wall thinning rate caused by solid particle erosion, such that a 1.1 safety factor is still appropriate?
3			WO-4760974 (conducted Sep-03-2020) identified several tubes with greater that 90% wall loss. The prior inspection (Sep-2015) showed these tubes as No Detectable Discontinuity.	If wall loss can go from No Detectable Discontinuity to 90% through wall in 5 years, provide the technical basis for allowing tube thinning less than 80% through-wall to be appropriate acceptance criteria.

4			According to the Response to Q173, #4, the replacement of cooling coils with new one was a recommendation from the trend IR 4352621. However, IR 4352621 was initiated 2 days after (apparently in response to) another pin hole leak was identified in the room cooler for RHR Pump Room A (AR04352219).	For the first OpEx example in the Open-Cycle Cooling Water System AMP, explain why the discussion did not include anything about the prior room cooler eddy current inspections being effectively blind for discontinuities near the tube return fittings. Also explain why the OpEx discussion did not include anything about the identification of the second leaking room cooler 7 months after the first one?

Deisel Generator System

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1			Drawing LR-CPS-M05-1035 (Sheet 10) contains Diesels Generators Air Dryer for the DG system. These dryers are shown as out of scope of LR.	Please describe why they are not in scope of LR.

Transient Cycle and Cumulative Usage Projections for 60 Years

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.1		LRA Section 4.3.1 indicates that the applicant's fatigue TLAA includes a CUF analysis for the reactor vessel support skirt.	Provide a document clarifying whether the fatigue TLAA for the support skirt is evaluated and dispositioned in LRA Section 4.3.2 (Class 1 component fatigue analysis). If not, a document clarifying which fatigue TLAA section addresses the reactor vessel support skirt.

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Reactor Vessel Internals TLAA

Question Number	LRA Section	LRA Page	Background / Issue (As applicable/needed)	Discussion Question / Request
1	4.3.7		LRA Tables 3.3.2-8 and 3.3.2-9 address the fatigue TLAAs of the piping and piping components exposed to diesel exhaust (Internal), which are associated with AMR note H.	Provide a document clarifying whether the fatigue TLAAs are evaluated and dispositioned in LRA Section 4.3.5 (non-Class 1 component fatigue analysis). If not, a document clarifying which fatigue TLAA section addresses these AMR items (TLAAs associated with note H).
2	4.3.7		LRA Table 3.1.2-3 addresses the AMR results for the jet pump assembly inlet riser, brace and sleeve, elbow, wedge, diffuser, and holddown beam bolts in relation to AMR item 3.1.1-3 (LRA page 3.1-70). The LRA table indicates that these jet pump components are subject to a fatigue TLAA. LRA Section 4.3.7.1 addresses the fatigue TLAA for the jet pump riser brace. However, the LRA does not clearly describe the fatigue TLAA evaluations and dispositions for the other jet pump components discussed in the background section above (i.e., jet pump assembly inlet riser, sleeve, elbow, wedge, diffuser, and holddown beam bolts).	Provide a document clarifying the specific LRA sections that describe the fatigue TLAA evaluations and dispositions for the jet pump components subject to a fatigue TLAA.
3	4.3.7		LRA Table 3.1.2-3 addresses the fatigue TLAA of the jet pump assemblies: holddown beam (Item IV.B1.R-53).	Provide a document clarifying which fatigue TLAA section (Section 4.3.X) addresses the TLAA disposition for this component and associated AMR item. If this component is bounded by another reactor vessel internal component in terms of fatigue analysis (e.g., cumulative usage factor analysis), please clarify the LRA section that describes the fatigue TLAA for the component bounding for the jet pump holddown beam.

4	4.3.7		SIA 1701003.305 report indicates that for some components, the Fen calculations use the average temperature approach (considering the threshold temperature for a material type).	Provide a document clarifying the following: (1) whether the average temperature approach is used only for simple, linear transients and (2) if not, why the conservatism of the applicant's approach is comparable to that of the modified rate approach described in NUREG/CR-6909, Rev. 1, Section 4.4