



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 24, 2017

LICENSEE: Entergy Operations, Inc.

FACILITY: Waterford Steam Electric Station, Unit 3

SUBJECT: SUMMARY OF TELECONFERENCES HELD ON AUGUST 23
AND 25, 2016, BETWEEN THE NRC AND ENTERGY OPERATIONS,
INC, CONCERNING RAI SET 1 PERTAINING TO THE WATERFORD
STEAM ELECTRIC STATION, UNIT 3 LICENSE RENEWAL
APPLICATION (CAC NO. MF7492)

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Entergy Operations, Inc. (Entergy or the applicant) held telephone conference calls on August 23 and 25, 2016, to discuss and clarify the staff's draft requests for additional information (DRAIs) provided in Enclosures 2 and 3 concerning the Waterford Steam Electric Station, Unit 3, license renewal application. The telephone conference call was useful in clarifying the intent of the staff's DRAIs.

Enclosure 1 provides a listing of the participants and Enclosures 2 and 3 for telephone conference calls held on August 23 and 25, 2016, respectively, contains the DRAIs discussed with the applicant, including a brief description on the status of the items.

Sincerely,

/RA/

Phyllis Clark, Project Manager
Projects Branch 1
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket No. 50-382

Enclosures:

1. List of Participants
2. Summary of Conference Call, August 23, 2016
3. Summary of Conference Call, August 25, 2016

cc: Listserv

LICENSEE: Entergy Operations, Inc.

FACILITY: Waterford Steam Electric Station, Unit 3

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Memo to Entergy Operations, Inc. from P. Clark dated January 24, 2017.

SUBJECT: SUMMARY OF TELECONFERENCES HELD ON AUGUST 23 AND 25, 2016,
BETWEEN THE NRC AND ENTERGY OPERATIONS, INC., CONCERNING RAI
SET 1 PERTAINING TO THE WATERFORD STEAM ELECTRIC STATION,
UNIT 3 LICENSE RENEWAL APPLICATION (CAC NO. MF7492)

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TELEPHONE CONFERENCE CALL
ENTERGY OPERATIONS, INC.
LICENSE RENEWAL APPLICATION

LIST OF PARTICIPANTS
AUGUST 23, 2016

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TELEPHONE CONFERENCE CALL
ENTERGY OPERATIONS, INC.
LICENSE RENEWAL APPLICATION

LIST OF PARTICIPANTS
AUGUST 25, 2016

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SUMMARY OF TELEPHONE CONFERENCE CALL
ENTERGY OPERATIONS, INC.
LICENSE RENEWAL APPLICATION
AUGUST 23, 2016

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Entergy Operations, Inc. (Entergy or the applicant) held a telephone conference call on August 23, 2016, to discuss and clarify the staff's draft requests for additional information (DRAIs) concerning the Waterford Steam Electric Station, Unit 3, license renewal application (LRA).

RAI B.1.1-1

Background:

The "detection of aging effects" program element of Generic Aging Lessons Learned (GALL) Report AMP XI.M18, "Bolting Integrity," recommends periodic inspections (at least once per refueling cycle) of closure bolting for signs of leakage to ensure the detection of age-related degradation due to loss of material and loss of preload.

LRA Section B.1.1, "Bolting Integrity," states that the Bolting Integrity Program is an existing program, with enhancements, that will be consistent with GALL Report AMP XI.M18. LRA Section B.1.1, Enhancement 1 to the "scope of program" program element states that the Bolting Integrity Program procedures will be enhanced to include submerged pressure-retaining bolting.

Issue:

Based on its review of the LRA and onsite review of program basis documents, the staff noted that the applicant's Bolting Integrity Program lacked information regarding the location, frequency, and method(s) of inspections for the submerged closure bolting. Noting that a submerged environment limits the ability to perform visual inspections and detect leakage of closure bolted connections and the applicant did not provide information on proposed inspection methods, it is not clear how the submerged closure bolting will be inspected such that loss of material and loss of preload can be detected prior to a loss of intended function.

Request:

For the submerged closure bolting within the scope of license renewal to be managed by the Bolting Integrity Program:

- a) For each location that submerged closure bolting is used, describe the frequency and method(s) of inspection to be used to detect loss of material and loss of preload on the submerged closure bolts.
- b) Provide a justification as to why the proposed frequency and method(s) of inspections will be sufficient to detect loss of material and loss of preload prior to a loss of intended function. Also describe how the proposed frequency and method(s) of inspection will be capable of detecting loss of material in crevice locations (e.g., threaded regions or the shank below the bolt heads) that are not readily visible.

RAI B.1.1-2

Background:

GALL Report Aging Management Programs (AMPs) XI.M18 and XI.S3 state that molybdenum disulfide (MoS_2) should not be used as a lubricant due to its potential contribution to stress corrosion cracking (SCC), especially for high-strength bolts. GALL Report AMPs XI.S6 states that preventive actions emphasize proper selection of lubricants to prevent or minimize cracking of high-strength bolts. The GALL Report also states that the applicant is to evaluate applicable operating experience to support the conclusion that the effects of aging are adequately managed.

LRA Section B.1.1, B.1.16, and B.1.38 state that the Bolting Integrity, Inservice Inspection-IWF, and Structures Monitoring Programs are existing AMPs, with enhancements and an exception, which will be consistent with GALL Report AMPs XI.M18, XI.S3, and XI.S6 respectively.

Issue:

LRA Sections B.1.1 states that the Bolting Integrity Program includes preventive actions to restrict the use of lubricants containing MoS_2 . LRA Section B.1.16 states that “[p]lant procedures prohibit the use of lubricants containing molybdenum disulfide.” LRA Section B.1.38 states that plant procedures use the recommendations in NUREG-1339, Electric Power Research Institute (EPRI) NP-5769, NP-5067, and TR-104213 to ensure proper specification of lubricant for bolting.

During its onsite audit, the staff confirmed that the bolting procedures had been revised to prohibit the use of MoS_2 ; however, it is not clear whether MoS_2 lubricants have been used at Waterford 3 before plant procedures were revised to prohibit their use.

Request:

State whether MoS_2 lubricants have been used on any high-strength structural bolts in sizes greater than 1 inch nominal diameter or any high-strength closure bolts within the scope of the Bolting Integrity, Inservice Inspection-IWF, and Structures Monitoring Programs. If MoS_2 lubricants have been used in the past, explain how the affected bolts will be managed for age-related degradation during the period of extended operation.

RAI B.1.3-1

Background:

On February 4, 2016, the staff issued the final version of LR-ISG-2015-01, “Changes to Buried and Underground Piping and Tank Recommendations.” The ISG replaces AMP XI.M41, “Buried and Underground Piping and Tanks,” and the associated UFSAR Summary Description issued in LR-ISG-2011-03, “Changes to the GALL Report, Revision 2 AMP XI.M41, ‘Buried and Underground Piping and Tanks’.”

LRA Section B.1.3, "Buried and Underground Piping and Tanks Inspection," and LRA Section A.1.3 (associated UFSAR Summary Description) were evaluated against AMP XI.M41 and the UFSAR Summary Description in LR-ISG-2011-03.

Issue:

The Buried and Underground Piping and Tanks Inspection program and associated UFSAR Summary Description have not been evaluated against the changes to AMP XI.M41 and the UFSAR Summary Description issued in LR-ISG-2015-01.

Request:

Compare the Buried and Underground Piping and Tanks Inspection program to AMP XI.M41 and the associated UFSAR Summary Description issued in LR-ISG-2015-01. State any changes to LRA Sections B.1.3 and Section A.1.3 necessary to be consistent with LR-ISG-2015-01. As necessary, state and justify exception(s) to recommendations that will not be incorporated into the Buried and Underground Piping and Tanks Inspection program.

RAI B.1.4-1

Background:

The Program Description of the Coating Integrity Program, and its associated FSAR Supplement, state that coatings that are within the scope of the program are those that are applied to the internal surfaces of in-scope components where loss of coating or lining integrity could impact the component's and downstream component's current licensing basis intended function(s).

Issue:

GALL Report AMP XI.M42, "Internal Coatings/Linings for In-scope Piping, Piping Components, Heat Exchangers, and Tanks," recommends that coatings are within the scope of the AMP where loss of coating or lining integrity could prevent satisfactory accomplishment of any of the component's or downstream component's current licensing basis intended functions identified under 10 CFR 54.4(a)(1), (a)(2), or (a)(3). The scope of the Coating Integrity program is not consistent with the "scope of program" program element of AMP XI.M42 because the term "and" implies that both the component's intended function and a downstream component's intended function must be impacted by loss of coating integrity for the coating to be within the scope of the program. AMP XI.M42 recommends that the criteria for inclusion are either of the impacts.

Request:

State the basis for using the term "and" in the Coating Integrity Program description or revise the term to "or" in LRA Section B.1.4 and LRA Section A.1.4 to clarify which coatings are within the scope of the program.

RAI B.1.4-2

Background:

During its review of plant-specific operating experience, the staff reviewed a condition report that documents that the internal surfaces of the fire pump diesel jacket water cooling heater might be coated.

Issue:

The LRA Table 2s do not cite the fire pump diesel jacket water cooling heater. It is not clear to the staff whether this component is coated, and if it is, how loss of coating integrity will be managed.

Request:

State whether the internal surfaces of the fire pump diesel jacket water cooling heater are coated. If they are coated, state how loss of coating integrity will be managed for this component.

RAI B.1.4-3

Background:

LRA Section B.1.4 states an exception to the “detection of aging effects” program element of AMP XI.M42. The exception states that the Coating Integrity program will provide a one-time inspection of the internal coating for the 11-foot diameter carbon steel circulating water piping. AMP XI.M42 recommends periodic inspections of coatings.

Issue:

The exception does not state that periodic inspections of the internal coatings of the 11-foot diameter circulating water piping will be subsequently conducted if the one-time inspection results do not meet acceptance criteria.

Request:

State whether periodic inspections of the internal coatings of the 11-foot diameter circulating water piping will be subsequently conducted if the one-time inspection results do not meet acceptance criteria. If periodic inspections will not be conducted, state the basis for not conducting these inspections.

D-RAI B.1.6-1

Background:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function will be maintained consistent with the current licensing basis for the period of extended operation. As

described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant.

LRA Section B.1.6 states that the Containment Inservice Inspection - IWE aging management program (AMP), with enhancement, will be consistent with the AMP XI.S1, "ASME Section XI, Subsection IWE," described in NUREG-1801. The "preventive action" program element of the GALL Report AMP XI.S1 states, in part: "The program is also augmented to require that the selection of bolting material installation torque or tension and the use of lubricants and sealants are in accordance with the guidelines of EPRI NP-5769, EPRI TR-104213, and the additional recommendations of NUREG-1339 to prevent or mitigate degradation and failure of structural bolting."

Section 3.2.B.2b of the **Aging Management Program Evaluation Report** (AMPER) document for LRA AMP B.1.6 states, in part: "The program is a condition monitoring program and does not include guidance for the selection of bolting material, installation torque or tension, and use of lubricants and sealants. The program is supplemented by existing plant procedures to ensure that the selection of bolting material installation torque or tension, and the use of lubricants and sealants is appropriate for the intended purpose. These procedures use the guidance contained in NUREG-1339 and in EPRI NP-5769, NP-5067, and TR-104213 to ensure proper specification of bolting material, lubricant, and installation torque." The staff was unable to verify the link between these existing procedures and the actual implementing procedures (e.g., SEP-CISI-104, SEP-RR-WF3-001) for the LRA B.1.6 AMP.

Issue:

It is not clear to the staff if the above statements in the preventive actions program element are consistent because (1) it appears to be an enhancement to an existing code-based condition monitoring [only] program, and (2) the staff was unable to identify a link between the AMP implementing procedure(s) and the existing supplemental procedure(s) being credited. The staff needs additional information to verify consistency of the LRA AMP "preventive action" program element with that of the GALL Report AMP. Based on review of the respective AMPER documents, the staff also notes that this is a common issue for the "preventive action" program element across LRA AMPs B.1.6 "Containment Inservice Inspection – IWE," and B.1.16 "Inservice Inspection – IWF."

Request:

1. For LRA AMPs B.1.6, and B.1.16, clarify how the "preventive action" program element in the LRA AMP is or will be consistent with the GALL Report AMP XI.S1, and XI.S3, respectively, with regard to supplemental preventive actions for selection of bolting material installation torque or tension and the use of lubricants and sealants in accordance with the guidelines of EPRI NP-5769, EPRI TR-104213, and the additional recommendations of NUREG-1339 to prevent or mitigate degradation and failure of structural bolting; or, justify the exception taken to the GALL Report AMP.
2. Update the LRA and FSAR supplement, as appropriate, to be consistent with the response to the above request.

D-RAI B.1.6-2

Background:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant.

LRA Section B.1.6 states that the Containment Inservice Inspection - IWE aging management program (AMP), with enhancement, will be consistent with the AMP XI.S1, "ASME Section XI, Subsection IWE," described in NUREG-1801. The "preventive action" program element of GALL Report AMP XI.S1 states, in part: "If the structural bolting consists of ASTM A325, ASTM F1852, and/or ASTM A490 bolts, the preventive actions for storage, lubricants, and stress corrosion cracking potential discussed in Section 2 of RCSC (Research Council for Structural Connections) publication "Specification for Structural Joints Using ASTM A325 or A490 Bolts," need to be considered."

The enhancement to the "preventive actions" program element of LRA AMP B.1.6 and Section 3.2.B.2b of the AMPER document, intended to achieve consistency with the GALL Report AMP states: "Revise plant procedures to include the preventive actions for storage of ASTM A325, ASTM F1852 and A490 bolting from Section 2 of Research Council for Structural Connections publication, "Specification for Structural Joints Using ASTM A325 or A490 Bolts." The staff noted that the applicant excluded the use of preventive actions for lubricants, and stress corrosion cracking potential by stating that a review of Section 2 of the RCSC publication concluded that the publication only addressed storage and does not address the preventive actions for lubricants and stress corrosion cracking potential for these bolts.

Issue:

It is not clear to the staff if the above statements are consistent because (1) the LRA AMP enhancement description does not include the RCSC Section 2 recommended preventive actions for *lubricants and stress corrosion cracking potential*, and (2) the related justification provided in the AMPER document appears to interpret the referenced RCSC standard and the GALL Report in a manner that is inconsistent with the considerations in the GALL Report AMP. Additionally, SRP-LR states that if an applicant takes credit for a program in the GALL Report, it is incumbent on the applicant to ensure that the plant program contains all the elements of the referenced GALL Report program.

The staff needs additional information to determine the adequacy of the stated enhancement to establish consistency with the "preventive action" program element of the GALL Report AMP. Based on review of the respective AMPER documents, the staff also notes that this is a common issue for the "preventive action" program element across LRA AMPs B.1.6 "Containment Inservice Inspection – IWE," B.1.16 "Inservice Inspection – IWF," and B.1.38 "Structures Monitoring."

Request:

1. For LRA AMPs B.1.6, B.1.16 and B.1.38, clarify how the described enhancement in the “preventive action” program element in LRA AMP is adequate to establish consistency with the GALL Report AMP XI.S1, XI.S3, and XI.S6, respectively, with regard to preventive actions for lubricants and stress corrosion cracking potential of ASTM A325, ASTM F1852, and/or ASTM A490 bolts; or, justify the exception to the GALL Report AMP.
2. Update the LRA and FSAR supplement, as appropriate, to be consistent with the response to the above request.

RAI B.1.6-3

Background:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function(s) will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant.

LRA Section B.1.6 states that the Containment Inservice Inspection - IWE aging management program (AMP), with enhancement, will be consistent with the AMP XI.S1, “ASME Section XI, Subsection IWE,” described in NUREG-1801. The “detection of aging effects” program element of GALL Report AMP XI.S1, “ASME Section XI, Subsection IWE,” recommends that the program be augmented to require surface examination, in addition to visual examination, to detect cracking in stainless steel penetration sleeves, dissimilar metal welds, bellows, and steel components that are subject to cyclic loading but have no current licensing basis (CLB) fatigue analysis. This program element also states that, where feasible, appropriate Appendix J tests (AMP X1.S4) may be performed in lieu of surface examination.

During the license renewal AMP audit, the staff noted that the “detection of aging effects” program element in the LRA AMPER document (WF3-EP-14-00008, Revision 1, Section 3.2.B.4.b) states: “Stainless steel penetration sleeves, dissimilar metal welds, bellows, and steel components that are subject to cyclic loading but have no CLB fatigue analysis are monitored for cracking. Additionally, XI.S4 Containment Leak Rate Program (10 CFR Part 50, Appendix J) tests may be performed in lieu of surface examination.” Further, the staff noted that the LRA AMP did not include any enhancement to the “detection of aging effects” program element to supplement (augment) the existing program and implementing procedures to require surface examination (or other enhanced examination method) capable of detecting cracking.

The technical basis for including the provision in the GALL Report (Revision 2) AMP XI.S1 to augment the program to require surface examination [or other enhanced examination] of stainless steel, dissimilar metal welds, and steel components subject to cyclic loading but have no CLB fatigue analysis is provided on pages II-446 and II-447 in Table II-22 of NUREG-1950 “Disposition of Public Comments and Technical Bases for Changes to License Renewal Guidance Documents NUREG-1801 and NUREG-1800.” The basis provided therein states, in part:

VT-3 examination may not detect fine cracks that could occur as a result of cyclic loading and are only pressure-tested as part of the containment Type A Integrated Leak Rate Test (ILRT). The frequency of Type A test is every 10 years and could be extended for up to 15 years if a licensee implements Option B, performance-based test, in accordance with 10 CFR Part 50 Appendix J. The ILRT frequency thus may not provide for early detection of cracking such that corrective actions are taken to prevent loss of primary containment leak-tightness. The program is therefore augmented to require surface examination for detection of cracking during the period of extended operation.

Issue:

Noting that visual examination may not detect fine cracks that could occur as a result of cyclic loading and that the LRA AMP did not identify any enhancement to augment the existing program and implementing procedures with examination method(s) capable of detecting cracking, it is not clear to the staff that the statements noted above for the "detection of aging effects" program element are consistent with the GALL Report because the LRA AMP basis document does not state that supplemental surface examination will be performed, in addition to visual examination, to detect cracking in stainless steel penetration sleeves, dissimilar metal welds, bellows, and steel components that are subject to cyclic loading but have no CLB fatigue analysis. Further, if the option to perform appropriate Appendix J tests in lieu of surface examination will be used for any of the mentioned components, the LRA AMPER document does not mention the type of Appendix J test that would be performed for the specific components in order for staff to evaluate the appropriateness of the test for timely detection cracking in these components.

Request:

1. State whether the supplemental surface examination recommended in GALL Report AMP X1.S1 will or will not be performed, in addition to visual examination, to detect cracking in the following containment pressure-retaining boundary components: stainless steel penetration sleeves, bellows, dissimilar metal welds, and other steel components that are subject to cyclic loading but have no CLB fatigue analysis. If supplemental surface examination will be performed, identify the components and indicate what standard will be used to perform surface examination of these components, and explain how it is captured in the implementing procedures of the LRA AMP without an enhancement.
2. If an Appendix J test is used to detect cracking, in lieu of supplemental surface examination, identify the applicable components, and indicate the type of Appendix J test that will be used for these applicable components and provide information to justify its appropriateness for timely detection of cracking prior to loss of intended function, consistent with the basis for the GALL Report provision indicated in the Background section.
3. If supplemental examination will not be performed or supplemental examination methods other than that described in GALL Report AMP XI.S1 will be used for any of the components listed in Request 1, describe the exception to the GALL Report AMP XI.S1 and justify the exception with regard to adequate capability of the LRA AMP to detect

cracking due to fatigue damage from cyclic loading consistent with the criteria of 10 CFR 54.21(a)(3).

4. Update the LRA and FSAR supplement, as applicable, to be consistent with the responses to the above requests.

D-RAI B.1.6-4

Background:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant. LRA Section B.1.6 states that the Containment Inservice Inspection - IWE aging management program (AMP), with enhancement, will be consistent with the ten elements of AMP XI.S1, "ASME Section XI, Subsection IWE," described in NUREG-1801.

During the audit, the staff reviewed condition report CR-WF3-2000-01375, dated 10/28/2000, that addressed plant-specific operating experience in which corrosion has been noted in the knuckle region of the steel containment vessel below the annulus moisture barrier area. The condition was initially investigated in area #15 (directly below maintenance access hatch) that revealed excessive corrosion in the region below the moisture barrier in the annulus. CR-WF3-2000-1375 was written to address and document corrective actions associated with the corrosion and flaking noted on the containment vessel to a depth of at least 18 inches below the surface of the outer moisture barrier in the annulus region. This condition appeared to exist around the entire knuckle region of the containment vessel within the annulus.

CR-WF3-2000-01375 noted that this corrosion was apparently from initial construction (from exposure to the weather), was determined to be non-active, and ultrasonic wall thickness measurements showed that the containment vessel wall thickness exceeded the design thickness of 2.1875 inches in all examined locations and that the containment vessel structural integrity and leak-tightness were not jeopardized. Chemical analysis of scale samples indicated the presence of chlorides and sulfides. The presence of these chemicals also indicates the potential for an active corrosion mechanism to be initiated should any moisture be introduced. The CR documented that the issue was addressed by taking several corrective actions including apparent cause evaluation, repair and supplementary examinations of the moisture barrier every refueling outage from RF10 (2001) through RF16 (2009), VT-1 examination and ultrasonic thickness (UT) measurements of containment vessel exposed by removal of moisture barrier, chemical analysis of elastomeric moisture barrier materials and scales (flaking) from areas of corrosion of the containment vessel, and examination of the adjacent concrete, to ensure that the corrosion mechanism was and expected to remain inactive unless reactivated by the presence of moisture.

Issue:

The above plant-specific operating experience of corrosion noted in 2000 in the annulus knuckle region of the steel containment vessel is not addressed in LRA Section B.1.6. There exists the potential that the existing corrosion, with presence of traces of chlorides and sulfides, of the steel containment vessel in the knuckle area below the annulus moisture barrier that was determined to be non-active may be reactivated by moisture and potentially impact containment vessel intended function prior to or during the period of extended operation. During the audit, the staff also came across condition reports CR-WF3-2012-05353 and CR-WF3-2012-07654 documenting non-conformances related to cracking, surface discontinuities and potential leak paths in the annulus moisture barrier identified during Refueling outage 18. The staff also noted that, during this outage, a construction opening for steam generator replacement was made in the Shield Building by hydrodemolition which could have resulted in intrusion of water into the annulus moisture barrier areas. The staff needs additional information, necessary to determine whether the applicant's plant-specific operating experience supports the sufficiency of the LRA AMP.

Request:

1. As part of the "operating experience" program element of LRA AMP B.1.6, summarize the plant-specific operating experience of corrosion around the entire circumference of the steel containment vessel in the knuckle region below the annulus moisture barrier documented in CR-WF3-2000-01375, its cause and actions taken to address it.
2. With regard to the above plant-specific operating experience described in CR-WF3-2000-01375, explain with sufficient technical detail, any enhancement that may be made to the LRA AMP to verify, prior to entering the period of extended operation, that the observed corrosion in the knuckle region continues to remain non-active and address adverse findings, if any, such that the containment vessel remains capable of performing its intended functions through the period of extended operation. Alternatively, explain why such a verification enhancement is deemed not necessary prior to entering the period of extended operation for the LRA AMP to meet the criteria of 10 CFR 54.21(a)(3).
3. Update the LRA and FSAR supplement, as appropriate, consistent with the response to the above request.

D-RAI A.1.6-1

Background:

Section 54.21(d) of 10 CFR requires that the FSAR supplement for the LRA must contain a summary description of the programs and activities for managing the effects of aging and the evaluation of time-limited aging analyses for the period of extended operation determined by paragraphs (a) and (c) of this section, respectively. As described in SRP-LR, the FSAR supplement defines the LRA AMP the applicant is crediting to satisfy 10 CFR 54.21(a)(3), and for AMPs consistent with the GALL Report, the applicant may demonstrate compliance by providing information in the FSAR supplement equivalent to that in Table 3.0-1 of the SRP-LR.

LRA Section B.1.6 states that the Containment Inservice Inspection - IWE aging management program (AMP), with enhancement, will be consistent with the AMP XI.S1, "ASME Section XI, Subsection IWE," described in NUREG-1801.

Issue:

The information in the FSAR supplement description in LRA Section A.1.6 "Containment Inservice Inspection – IWE" and the LRA AMPER document (WF3-EP-14-00008, Revision 1) does not appear to provide an adequate summary description of the LRA AMP B.1.6 because (1) it does not sufficiently define what the LRA AMP covers in terms of components, materials, environments, aging effects, and key condition monitoring actions; rather, a significant part of the supplement primarily repeats the structural configuration description of the steel containment vessel that is already in FSAR Section 3.8.2, and (2) the description does not provide information consistent with that for program XI.S1 in SRP-LR Table 3.0-1. The staff needs additional information necessary to verify the sufficiency of the FSAR supplement program description.

Request:

Clarify how the FSAR supplement in LRA Section A.1.6 adequately defines the LRA AMP B.1.6 in terms of components, materials, environments, aging effects, and key condition monitoring actions; or, provide a revised FSAR supplement description for LRA Section A.1.6 to also include information, equivalent to that in SRP-LR Table 3.0-1 for GALL Report AMP XI.S1, that sufficiently defines the LRA AMP in terms of components, materials, environments, aging effects, and key condition monitoring actions.

D-RAI 3.5.2-1-1

Background:

Section 54.21(a)(3) of 10 CFR requires the applicant to demonstrate that the effects of aging for structures and components will be adequately managed so that the intended function will be maintained consistent with the current licensing basis for the period of extended operation. As described in SRP-LR, an applicant may demonstrate compliance with 10 CFR 54.21(a)(3) by referencing the GALL Report and when evaluation of the matter in the GALL Report applies to the plant.

LRA Table 3.5.2-1 "Reactor Building" includes, on LRA page 3.5-52, an aging management review (AMR) line item for component type "Steel components: personnel airlock, escape lock, construction hatch; maintenance hatch: locks, hinges and closure mechanisms" of "carbon steel" material in an "air-indoor uncontrolled" environment for "loss of material" aging effect with generic Note A that claimed consistency with GALL line item II.B4.CP-148 corresponding to SRP-LR Table 3.5-1, item 31.

Issue:

The staff noted that the GALL Report line item II.B4.CP-148 applies to component "pressure-retaining bolting" for BWR containments, and not the components described in the LRA Table 3.5.2-1 line item referenced above. The staff also noted that LRA Table 3.5.2-1 includes,

on LRA page 3.5-52, another AMR line item for component type “Steel components: personnel airlock, escape lock, construction hatch; maintenance hatch” with the same material, environment, and aging effect combination that credited GALL Report line item II.A3.C-16 (corresponding to Table 1 item 3.5.1-28) with a generic Note A.

Request:

Clarify the apparent discrepancy and/or duplication in the LRA Table 3.5.2-1 line item for component type “Steel components: personnel airlock, escape lock, construction hatch; maintenance hatch: locks, hinges and closure mechanisms” noted above for the loss of material aging effect, and establish how it is consistent with the GALL Report line item II.B4.CP-148 to justify a generic Note A.

RAI B.1.7-1

Background:

NUREG-1801, Revision 2, “Generic Aging Lessons Learned (GALL) Report,” states:

[I]f an applicant takes credit for a program in the GALL Report, it is incumbent on the applicant to ensure that the conditions and operating experience at the plant are bounded by the conditions and operating experience for which the GALL Report program was evaluated. If these bounding conditions are not met, it is incumbent on the applicant to address the additional effects of aging and augment the GALL Report aging management program(s) as appropriate.

The Waterford 3 LRA B.1.7 “Containment Leak Rate” program states that the applicant has implemented Option B of the 10 CFR Part 50 Appendix J for leak rate testing (LRT) and is consistent, with no exceptions or enhancements, with the GALL Report AMP XI.S4. The regulation in 10 CFR Part 50, Appendix J requires LRTs to assure containment leakage does not exceed allowable leakage rates. The GALL Report AMP XI.S4, “10 CFR Part 50, Appendix J,” “scope of program,” program element sets the bounding condition, “the scope of the containment LRT program includes all containment boundary pressure-retaining components.”

The regulation in 10 CFR Part 54.21(a) requires relevant aging effects (e.g., as described in GALL Report, Rev 2) associated with the containment boundary pressure-retaining components to be adequately managed so that their intended function will be maintained consistent with the current licensing basis (CLB) for the period of extended operation.

Issue:

The LRA AMP B.1.7 Basis Document contains Procedure SEP-APJ-005, “Primary Containment Leakage Rate Testing (Appendix J) Program,” as the implementing procedure for the 10 CFR 50 Appendix J LRT. The procedure specifies a number of containment structure pressure-retaining components (e.g., penetrations, valves) to be excluded from local leak rate tests (LLRTs). It is not clear how the applicant’s containment leak rate AMP will meet the bounding condition described in the “scope of program” program element to satisfy program

consistency with the GALL Report AMP XI.S4, and adequately manage aging effects of the excluded components so that their intended function will be maintained consistent with the CLB for the period of extended operation.

Request:

1. For those containment pressure-retaining components that have been excluded from the "scope of program," program element of LRA AMP B.1.7 "Containment Leak Rate," identify how aging effects will be adequately managed during the period of extended operation.
2. Indicate which AMPs, TLAAs, and/or AMR line items will be used to manage the aging effects for each of the components not included, or justify why an AMP, TLAA, and/or AMR line item is not necessary to manage the relevant aging effects during the period of extended operation.

RAI B.1.11-1

Background:

By letter dated December 16, 2008, the staff issued NRC Regulatory Issue Summary (RIS) 2008-30, which discusses the staff's concern that the use of certain simplified analysis methodology to demonstrate compliance with the ASME Code fatigue acceptance criteria could be nonconservative. GALL Report Section X.M1 recommends that a confirmatory analysis be performed to determine if the staff's concerns in RIS 2008-30 are applicable and have been addressed.

Issue:

LRA Section B.1.11 discusses the applicant's Fatigue Monitoring Program. The staff noted that the LRA does not address how the staff's concerns in RIS 2008-30 have been addressed at Waterford.

Request:

Clarify how the staff's concerns in RIS 2008-30 are applicable to Waterford. Justify that either: a) the concerns were addressed, or b) the concerns do not apply at Waterford.

D-RAI B.1.17-01

Background:

Title 10 of the Code of Federal Regulations Part 50.34(h)(3), "Conformance with the Standard Review Plan (SRP)," states:

[t]he SRP was issued to establish criteria that the NRC staff intends to use in evaluating whether an applicant/licensee meets the Commission's regulations. The SRP is not a substitute for the regulations, and compliance is not a requirement. Applicants shall identify differences from the SRP acceptance

criteria and evaluate how the proposed alternatives to the SRP criteria provide an acceptable method of complying with the Commission's regulations.

Table 3.0-1, "FSAR Supplement for Aging Management of Applicable Systems," of NUREG 1800, Revision 2, "Standard Review Plan for Review of License renewal Applications for Nuclear Power Plants," (SRP-LR) outlines the FSAR acceptance criteria for an AMP to be consistent with NUREG 1801, "Generic Aging Lessons learned (GALL) Report," Revision 2, AMP XI.M23 FSAR. The SRP-LR for the GALL Report AMP XI.M23 FSAR acceptance criteria states, "[t]he number and magnitude of lifts made by the hoist or crane are also reviewed."

Issue:

The Waterford 3 LRA AMP B.1.17 FSAR, LRA Section A.1.17, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program," does not address the number of lifts made for the scoped-in hoists or cranes. It is not clear how the applicant intends to meet the FSAR acceptance criteria for the GALL Report AMP XI.M23 as outlined in the SRP-LR, for LRA Section A.1.17.

Request:

1. Request additional information to identify the number and magnitude of lifts made for scoped-in hoists and cranes as specified by GALL Report AMP XI.M23 FSAR acceptance criteria. Alternatively, identify differences from the SRP acceptance criteria with evaluation of how the alternative to the SRP criteria would be considered acceptable.
2. As applicable, update the FSAR Supplement, LRA Section A.1.17, to reflect the fact that AMP B.1.17, "Inspection of Overhead Heavy Load and Light Load (Related to Refueling) Handling Systems Program," includes a review of the number and magnitude of lifts made by hoists and cranes.

RAI B.1.35-1

Background:

LRA Sections A.1.35 and B.1.35, which concern inspections for loss of material due to selective leaching, state that, "follow-up for unacceptable inspection findings includes an evaluation using the corrective action program and possible expansion of the inspection sample size and location."

Issue:

The "corrective actions" program element of the GALL Report AMP XI.M33 recommends that, "[u]nacceptable inspection findings result in additional inspection(s) being performed, which may be on a periodic basis, or in component repair or replacement." LRA Section B.1.35 is not consistent with GALL Report AMP XI.M33, which recommends that additional inspections will be

conducted when inspections result in unacceptable results; whereas, the LRA AMP and FSAR Supplement state that there might be additional inspections.

Request:

State the criteria, and its basis, for determining that an expansion of the inspection sample size and location would not occur if unacceptable inspection findings are detected during inspections for loss of material due to selective leaching. Alternatively, revise the LRA Sections A.1.35 and B.1.35-1 to be consistent with the "corrective actions" program element of GALL Report AMP XI.M33.

Teleconference Summary Discussion:

RAIs B.1.1-1, B.1.1-2, B.1.4-1, B.1.4-2, B.1.4-3, B.1.35-1, A.1.6-1, and 3.5.2-1-1 were not revised and were to be issued as is.

RAIs B.1.3-1, B.1.7-1, B.1.17-01, B.1.6-1, B.1.6-4, and B.1.11.1 were revised for clarity and accuracy. Final versions of these RAIs were to be formally issued in an RAI letter.

RAIs B.1.33-2 and B.1.33-3 were discussed but were put on hold pending further review by the staff.

SUMMARY OF TELEPHONE CONFERENCE CALL
ENTERGY OPERATIONS, INC.
LICENSE RENEWAL APPLICATION
AUGUST 25, 2016

The U.S. Nuclear Regulatory Commission (NRC or the staff) and representatives of Entergy Operations, Inc. (Entergy or the applicant) held a telephone conference call on August 25, 2016, to discuss and clarify the staff's draft requests for additional information (DRAIs) concerning the Waterford Steam Electric Station, Unit 3, license renewal application (LRA).

RAI B.1.33-1

Background:

LRA Section B.1.33 describes the Reactor Vessel Internals Program as an existing program, that when enhanced, will be consistent with the program elements in Generic Aging Lessons Learned (GALL) Report AMP XI.M16A, "PWR Vessel Internals." The reactor vessel internals components at WF3 were designed by Combustion Engineering Company (CE). The AMP is based on the inspection and evaluation criteria in EPRI MRP Report No. 1022863, "Materials Reliability Program: Pressurized Water Reactor Internals Inspection and Evaluation Guidelines (MRP-227-A)," dated January 9, 2012. During the audit of this AMP on July 25 – 28, 2016, the staff reviewed the applicant's program basis documents to verify consistency with the program elements in GALL AMP XI.M16A.

Issue:

1. The "detection of aging effects" program element of LRA AMP identifies that the program will implement the inspection criteria in the following tables in the MRP-227-A report, as defined by the EPRI MRP: (a) Table 4-3 for "primary" reactor vessel internal components, (b) Table 4-6 for "expansion" RVI components, and (c) Table 4-9 for "existing program" RVI components. The tables referenced in the "detection of aging effects" element are those for RVI components in Westinghouse-designed PWRs. The appropriate CE-design table references for the "primary," "expansion," and "existing program" RVI components at WF3 are Tables 4-2, 4-5, and 4-8 in the MRP-227-A report.
2. The "acceptance criteria" program element in LRA AMP B.1.33 identifies that the program will implement the evaluation and acceptance criteria in Table 5-1 of the MRP-227-A report. The appropriate CE-design table reference for the RVI components at WF3 is Table 5-2 in the MRP-227-A report.

Request:

1. Clarify whether LRA AMP B.1.33, "Reactor Vessel Internals Program," will be implementing the inspection criteria in the following tables in EPRI MRP Report MRP-227-A: (a) Table 4-2 for "primary" reactor vessel internal components, (b) Table 4-5 for "expansion" RVI components, and (c) Table 4-8 for "existing program" RVI components. If not, justify why the AMP will be implementing the inspection criteria in Tables 4-3, 4-6, and 4-9 of the

MRP 227-A report, as stated in the “detection of aging effects” element discussion of the AMPER basis document for this AMP.

2. Clarify whether LRA AMP B.1.33, “Reactor Vessel Internals Program,” will be implementing the evaluation and acceptance criteria in Table 5-2 of the MRP-227-A report. If not, justify why the AMP will be implementing the evaluation and acceptance criteria in Table 5-1 report, as stated in the “acceptance criteria” element discussion of the AMPER basis document for this AMP.

RAI B.1.33-2

Background:

The staff’s requests in Applicant/Licensee Action Items (A/LAIs) #2 and #5 in the NRC’s safety evaluation (SE dated December 16, 2011, as given in ADAMS ML111600498) for MRP-227-A are applicable to this request. This applies to the “ICI thimble tubes – lower” components identified in LRA Table 3.1.2-2. In the documentation reviewed during the AMP audit, the staff noted that the applicant has replaced the “ICI thimble tubes – lower” in the plant design with tubes that are made from Zircaloy materials that have been plated with chromium plated stainless steel. In the applicant’s June 18, 2015, supplement to their inspection plan (ML15170A377), the applicant indicated that it would implement periodic measurements of the replaced thimble tubes in order to monitor the growth of the thimble tubes. Since the aging effect requiring management is irradiation growth (i.e., changes in dimension due to distortion, or void swelling), the staff agrees that physical measurements are appropriate as condition monitoring techniques for the components.

Issue:

In MRP-191, the evaluation for ICI thimble tubes in CE-designed reactors (ICI thimble tube – lower) assumes that the components are made from un-plated Zircaloy materials. As a result, the assessment of aging for the design of the ICI thimble tube components at WF3 is appropriate for the scope of the applicant’s response to A/LAI #2. In addition, the applicant has not addressed its criteria for performing physical measurements of the “ICI thimble tube – lower” components as part of the applicable response to A/LAI #5. However, aging management of the components has not yet been assessed in the applicant’s response to A/LAIs #2 and #5.

Request:

Provide the basis (i.e., justify) why the assessment of aging in the ICI thimble tubes has not been discussed and evaluated as part of the applicant’s basis for responding to A/LAIs #2 and #5 in Appendix C of the LRA. As part of this response, identify the type of physical measurements that will be used to monitor for changes in dimension (due to grain growth, void swelling, or distortion) of the “ICI thimble tubes – lower” components in the plant design, and the inspection schedule or frequency that is or will be applied to the physical measurements of these components. Provide and justify the acceptance criteria that will be used to assess the physical measurements that will be performed on these components. Amend the LRA appropriately if it is determined that the assessment

of these components should have been included in the responses that were provided to A/LAIs #2 and #5 in the LRA (Refer to LRA Appendix C).

RAI B.1.33-3

Background:

The staff's requests in Applicant/Licensee Action Items (A/LAIs) #2 and #7 in the NRC's safety evaluation (SE, refer to ADAMS ML111600498) for MRP-227-A are applicable to this request. A/LAI #7 of the NRC's safety evaluation for MRP-227-A states that applicants/licensees of B&W, CE, and Westinghouse reactors are required to develop plant-specific analyses to be applied for their facilities to demonstrate that CE lower support columns made from cast austenitic stainless steel (CASS) materials will maintain their functionality during the period of extended operation or for additional RVI components that may be fabricated from CASS, martensitic stainless steel or precipitation-hardened stainless steel materials.

Issue:

In LRA AMR line items for the CEA shroud extension shaft guide and the CEA shroud assembly tube, the material that the components are fabricated from is CASS. These two items are assessed in the MRP-191 report, but the evaluations of these components in MRP-191 assume that the components are made from wrought stainless steel materials instead of CASS. If these components are made from CASS instead of wrought stainless steel, the assessment of aging for the design of the components at WF3 is appropriate for the scope of the applicant's responses to A/LAIs #2 and #7, particularly when evaluated for the management of thermal aging embrittlement (TE) in the components.

Request:

Provide the basis (i.e., justify) why the assessment of aging in the CEA shroud extension shaft guides and the CEA shroud assembly tubes has not been discussed and evaluated as part of the applicant's basis for responding to A/LAIs #2 and #7 in Appendix C of the LRA. Identify the CASS materials used in the fabrication of these components and identify whether the materials are considered to be susceptible to loss of fracture toughness due to TE. If the components are susceptible to potential loss of fracture due to TE, justify why the components would not need to be assessed in either functionality, susceptibility, or flaw tolerance analyses, as requested in A/LAI #7, and why the assessment of TE in analyses would not need to be submitted to the NRC for review and approval under the criteria of A/LAI #7.

Amend the LRA accordingly if it is determined that these CASS components should have been assessed in greater detail for the responses that have been provided to A/LAIs #2 and #7 in Appendix C of the LRA.

Teleconference Summary Discussion:

RAI B.1.33-1, were revised for clarity and accuracy. Final versions of these RAIs were to be formally issued in an RAI letter.

RAIs B.1.33-2 and B.1.33-3 were discussed but were put on hold pending further review by the staff.