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GNRO-2014/00076

November 6, 2014

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Response to Request for Additional Information (RAI) Set 51 dated September 11, 2014
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCE: U.S. NRC Letter, "Request for Additional Information for the Review of Grand Gulf Nuclear Station, License Renewal Application, Set 51" dated September 11, 2014 (GNRI-2014/00096)

Dear Sir or Madam:

Entergy Operations, Inc. is providing, in Attachment 1, the response to the referenced Request for Additional Information (RAI) Set 51. Attachment 2 contains changes to the License Renewal Application (LRA) as a result of the responses to the above referenced RAIs.

This letter includes revisions to existing commitments (section A.4 in Attachment 2).

If you have any questions or require additional information, please contact James Nadeau at 601-437-2103.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 6th day of November, 2014.

Sincerely,

Thomas Cantu for
Kevin. J Mulligan.

KJM/ras

Attachments:

1. Response to Request for Additional Information (RAI) set 51
2. Changes to LRA due to Responses to Set 51 RAIs

cc: with Attachments

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Attachment 1 to

GNRO-2014/00076

Response to Requests for Additional Information (RAI) Set 51

The format for the Requests for Additional Information (RAI) responses below is as follows. The RAI is provided in its entirety as received from the Nuclear Regulatory Commission (NRC) with background, issue and request subparts. This is followed by the Grand Gulf Nuclear Station (GGNS) RAI response to the individual questions.

RAI 3.0.3-1-RIC-1

Background:

By letter dated May 13, 2014, Entergy responded to Request for Additional Information (RAI) 3.0.3-1, and addressed the recurring internal corrosion portion of LR-ISG-2012-02. In its response, Entergy stated that, based on a review of plant-specific operating experience from the last 5 years, microbiologically-influenced corrosion (MIC) is a recurring internal corrosion issue as defined in LR-ISG-2012-02. Entergy also stated that it monitors loss of material due to MIC in the following four systems of the facility: (1) standby service water (SSW) system, (2) plant service water (PSW) system, (3) circulating water system, and (4) fire protection – water system. In addition, Entergy modified LRA Section B.1.35, "Periodic Surveillance and Preventive Maintenance," (PSPM) to manage recurring internal corrosion in these systems and added aging management review (AMR) items in the corresponding system tables of the LRA.

In addition, Entergy amended the table in the program description for the PSPM program to include aging management activities associated with recurring internal corrosion. The amended table states that wall thickness measurements will use ultrasonic testing (UT) or other suitable techniques to identify loss of material due to MIC. The amended table also states that a minimum of five MIC degradation inspections would be performed per refueling cycle until MIC degradation no longer met the criteria for recurring internal corrosion. In addition, the amended table states that inspection locations would be "based on pipe configurations, flow conditions, and operating history to represent a cross-section of potential MIC sites," and these locations would be periodically reviewed to validate their relevance and usefulness. The response indicates that approximately 60 inspections have been performed in the last 5 years.

The staff notes that Section A.1.2.3.4, "Detection of Aging Effects," in NUREG-1800, Revision 2, "Standard Review Plan for License Renewal Applications for Nuclear Power Plants" (SRP-LR), states that when sampling is used to represent a larger population of components, the basis for the sample size should be provided, and the samples should be biased toward locations most susceptible to the aging effect of concern. The SRP-LR also states that provisions for expanding the sample size, when degradation is detected in the initial sample, should be included. The staff also notes that because the PSPM program is a plant-specific aging management program (AMP) which does not correspond with an AMP in the GALL Report, the LRA should contain a description of each program element.

Issue:

1. The response to RAI 3.0.3-1 states that MIC is monitored in the SSW, PSW, circulating water, and fire protection – water systems. However, the amended PSPM program also identifies the component cooling water (CCW) system as an additional system that will be monitored for MIC in response to the recurring internal corrosion issue.

2. The amended AMP states that a minimum of five components will be inspected for MIC per refueling cycle until the criteria for recurring internal corrosion are not met. However, it is not evident if a minimum of five components will be inspected in each of the systems that were

identified as being susceptible to recurring incidents of MIC or a minimum of five components in the collective set of systems that were identified as being susceptible to recurring incidents of MIC. The staff notes that if the current minimum sample size is a total of five inspections per refueling cycle, this appears to be substantially less than the average sample size that was inspected for the last 5 years. The staff also notes that the existing "detection of aging effects" program element for the PSPM program, states that a representative sample is 20 percent of the population with a maximum of 25 components. However, it is not evident if the sample size for recurring internal corrosion will be consistent with this because this program element did not provide any clarification for the recurring internal corrosion issue.

3. The SRP-LR states that the sample of components selected for examination should be biased towards those locations that are most susceptible to the specific aging effect of concern in the period of extended operation – in this case MIC. In contrast, the amended AMP states, in part, that inspection location selection is based on piping configurations, flow conditions, and operating history to select piping components in SSW, PSW, CCW, Circulating Water, and Fire Protection – Water Systems, and the sample will represent a cross-section of potential MIC sites. It is not evident how the application of these sample selection criteria will be used to rank SSW, PSW, CCW, Circulating Water, and Fire Protection – Water System components for susceptibility to MIC. Therefore the sampling criteria used to select components for inspection may not be inspecting components in these systems that are most susceptible to MIC degradation during the period of extended operation.

4. The amended AMP identifies that either UT or another suitable inspection technique will be used as the augmented inspection method for inspecting these components. However, the augmented inspection basis does not clarify which type of inspection techniques would be used if UT is not selected as the applicable non-destructive examination basis. The staff notes that the existing "detection of aging effects" program element states that established techniques such as visual inspections are used.

5. The amended AMP did not include any provisions for expanding the sample size or clarify the inspection expansion criteria that will be applied if further corrosion is detected in these systems as a result of implementing these augmented inspections.

Request:

1. Clarify whether MIC has ever been detected in the CCW system, and if so whether any consequent loss of material met the criteria specified in LR-IS-2012-02 for recurring internal corrosion. Since the CCW system will be monitored as part of the recurring internal corrosion issue, justify why the response did not propose any amendments of LRA Table 3.3.2-8, "Component Coolant Water System," and LRA Table 3.3.2-19-23, "Component Cooling Water System, Nonsafety-Related Components Affecting Safety-Related Systems," to include AMR items for recurring internal corrosion.

2. Clarify and justify whether the program will inspect a minimum of five piping component locations in each of the five systems (i.e., the SSW, PSW, CCW, Circulating Water, and Fire Protection – Water Systems) that the program includes for recurring internal corrosion or whether the amended AMP will inspect only a minimum of five component locations in the collective set of systems that were identified as being susceptible to recurring occurrences of MIC.

3. Justify why the sample of components selected for monitoring loss of material due to MIC is directed only at a cross-section of potential MIC sites and is not being biased toward locations most susceptible to the aging effect of concern. Describe, clarify, and justify how the use of component configurations, system flows, and operating history will be used to rank piping components in SSW, PSW, CCW, Circulating Water, and Fire Protection – Water Systems for occurrences of MIC during the period of extended operation and how the ranking results will be used to pick components for UT inspection such that the sample set will not omit inspections of components that are considered to be highly susceptible to MIC.

4. Clarify and justify the alternative inspection method that will be applied to these components if UT will not be selected as the basis for performing the inspections.

5. Identify and justify any component inspection sample expansion criteria that will be applied to the inspections if further evidence of MIC or other corrosion effects are detected in these systems.

Response to RAI 3.0.3-1-RIC-1

1. MIC has not been detected in the CCW system. The reference to the CCW system will therefore be removed from the PSPM program description in LRA Sections A.1.35 and B.1.35, and no associated changes to component cooling water LRA tables are required.

2. In the last 5 years, 60 inspections have been performed. This inspection rate is expected to decline as the number of MIC sites is reduced in future years, though it could increase should the incidence of MIC increase. The "detection of aging effects" program element for the PSPM program does not invoke the representative sample criterion for the recurring internal corrosion activities. The number of inspection activities is based on the previous evaluations, calculated remaining service life, and previous selected areas of concern. Sixteen inspections are scheduled for the next cycle; however, the number of inspections could change depending on evaluation of the current cycle inspection results. A minimum of five MIC degradation inspections in the collective set of systems will be performed per cycle until MIC no longer meets the criteria for recurring internal corrosion. This minimum rate of five inspections per cycle will result in 25 inspections in a 10-year period, which is consistent with the inspection rate for other programs such as AMP XI.M38, Inspection of Internal Surfaces in Miscellaneous Piping and Ducting Components, per LR-ISG-2012-02.

3. The components selected for MIC inspections are biased toward locations most susceptible to MIC. The following characteristics of components most conducive to MIC will be considered during sample selection.

   - Inadequately treated water source.
   - Susceptible to the introduction of impurities (solids) (e.g., open-cycle cooling water).
   - Cross-tied to any MIC-susceptible system.
   - Areas of "no flow" (stagnant water).
   - Areas of "low flow" (< 3 fps). Low flow areas may include pump suction bells, heat exchanger heads and piping headers.
   - Areas of intermittent flow.
   - Areas with silt and sand deposits. Examples include the following:

  - Horizontal branches on long pipe runs.
  - Long vertical runs.
  - Piping at lower elevations of service water systems.
  - Expanders with abrupt diameter changes.
- Dead legs (e.g., instruments and drain ports, sample stations, caps at tee joints, areas with no flow, or other areas that cannot be flushed or are not flushed regularly).
- Components in wet lay-up without proper water chemistry.
- Areas that create crevices for bacteria to take hold (e.g., backing rings, socket welds, screwed fittings).

Plant and industry operating experience may also identify other factors that warrant the selection of components for inspection under the MIC program.

The implementing procedure will be revised to clearly state that the most susceptible locations are selected for inspection.

4. The program description in LRA Sections A.1.35 and B.1.35 will be revised to specify that UT or RT will be used for inspecting for loss of material due to MIC. UT is the primary method used and is an effective and industry-accepted method of inspection for MIC. RT can be used for those configurations where UT is not effective, such as small bore piping with socket-welded fittings. The "detection of aging effects" program element indicates that established inspection methods to detect aging effects may include visual inspections or other NDE techniques for metallic components, which includes UT or RT.

5. The scope of MIC examinations will be expanded if substantial MIC is detected during inspections. Scope expansion includes consideration of other locations for additional sampling such as similar components in the same or redundant trains. Substantial MIC is considered an increased rate of detection of new MIC sites, increased rates of wall thinning at known sites, or unexpected piping wall loss that results in wall thickness near or below code minimum wall thickness.

Revisions to LRA Sections A.1.35 and B.1.35 are provided in Attachment 2. These changes are made to LRA sections that were revised by letter GNRO-2014/00030 dated May 13, 2014.

RAI 3.0.3-1-CUI-1

Background:

By letter dated May 13, 2014, the applicant amended LRA Table 3.3.2-7, "Standby Service Water System – Summary of Aging Management Evaluation," and LRA Table 3.3.2-9, "Plant Service Water System – Summary of Aging Management Evaluation," to include new plant-specific AMR items for managing corrosion-related effects (i.e., aging effects induced by condensation – corrosion under insulation) in insulated, safety-related piping and piping components of the SSW and PSW systems.

Issue:

In the letter of May 13, 2014, the applicant did not amend LRA Table 3.3.2-19-16, "Standby Service Water System, Nonsafety-Related Components Affecting Safety-Related Systems – Summary of Aging Management Evaluation," and LRA Table 3.3.2-19-19, "Plant Service Water System, Nonsafety-Related Components Affecting Safety-Related Systems – Summary of Aging Management Evaluation," to include AMR items analogous to those included for insulated, safety-related SSW and PSW piping components in LRA Tables 3.3.2-7 and 3.3.2-9. The staff needs clarification on why the AMR item bases for managing corrosion under insulation in insulated piping components of the SSW and PSW systems do not apply to LRA Tables 3.3.2-19-16 and 3.3.2-19-19 as well.

Request:

Provide your basis why LRA Table 3.3.2-19-16, "Standby Service Water System, Nonsafety-Related Components Affecting Safety-Related Systems – Summary of Aging Management Evaluation," and LRA Table 3.3.2-19-19, "Plant Service Water System, Nonsafety-Related Components Affecting Safety-Related Systems – Summary of Aging Management Evaluation," have not been amended to include AMR items for nonsafety-related, insulated piping and piping components in the SSW and PSW systems analogous to those included for safety-related, insulated piping components in LRA Tables 3.3.2-7 and 3.3.2-9.

Response to RAI 3.0.3-1-CUI-1

Tables 3.3.2-19-16 and 3.3.2-19-19 have been amended to include AMR items for nonsafety-related, insulated piping and piping components in the SSW and PSW systems analogous to those included for safety-related, insulated piping components in LRA Tables 3.3.2-7 and 3.3.2-9.

Revisions to LRA Tables 3.3.2-19-16 and 3.3.2-19-19 are provided in Attachment 2.

RAI 3.0.3-1-FWS-1

Background:

Exception Footnote 3 for LRA Section B.1.21 dated May 13, 2014, states that a "version" of a main drain test is conducted in each building on annual basis. It also states that main header flow testing is conducted in seven loops that supply the standpipe system.

Exception No. 4 states that more than 30 main drain tests are performed throughout the plant.

Issue:

Given the use of the term "version," it is not clear to the staff how main drain tests are conducted and, as a result, whether the tests have the capability to detect potential flow blockage. In addition, Exception No. 4 did not state the periodicity of conducting 30 main drain tests and header flows.

Request:

1. State how main drain tests are conducted in comparison to NFPA 25 (2011 Edition) Sections 6.3.1.5 and 13.2.5 including details such as test location, parameters monitored, acceptance criteria, and how test results are trended.

2. Where test details differ from those in NFPA 25, state the basis for why the alternative testing will be equally effective at detecting blockage.

3. State the periodicity of conducting the 30 main drain tests. If the periodicity is longer than a year, state the basis for why potential flow blockage will be detected prior to the fire water system not being able to perform its current licensing basis intended function(s).

4. State the periodicity of conducting header flow testing. If the periodicity is longer than 5 years, state the basis for why potential flow blockage will be detected prior to the fire water system not being able to perform its current licensing basis intended function(s).

Response to RAI 3.0.3-1-FWS-1

1. The main drain tests are performed consistent with NFPA 25 (2011 Edition), Section 13. 2.5. Main drain tests are performed at the standpipe or riser low point drain. A pressure gauge at the standpipe or riser control valve is used for the system being tested to determine static supply water pressure. The drain valve is opened, and after the flowing pressure stabilizes, a flowing pressure is recorded from the same gauge. The Fire Water System Program described in LRA Sections A.1.21 and B.1.21 will be revised to specify a flow blockage evaluation if during main drain testing the flowing pressure drops more than 10 percent from the previous test at the same location.

   Revisions to LRA Sections A.1.21, A.4, and B.1.21 are provided in Attachment 2.

2. Test details do not differ from those in NFPA 25.

3. All main drain tests are performed on at least an annual basis.

4. Header flow testing is performed every three years as required by the Technical Requirements Manual.

RAI 3.0.3-1-FWS-2

Background:

Exception No. 6 for LRA Section B.1.21 dated May 13, 2014, states that adhesion testing in accordance with ASTM D 3359, "Standard Test Methods for Measuring Adhesion by Tape Test," is not performed on fire water storage tank internal coatings. In addition, the exception states that holiday testing and ultrasonic thickness checks or mechanical measurements of any identified corroded areas are conducted. An enhancement contains a list of tests and inspections that will be conducted on the internal surfaces of the fire water storage tank.

Issue:

The staff noted that NFPA 25 Section 9.2.7 specifies vacuum box testing for flat bottom tanks; however, it is not stated as being performed in either Exception No. 6 or the enhancement.

Request:

1. Clarify whether vacuum box testing will be conducted in accordance with NFPA 25 Section 9.2.7, item (6). If not, provide the basis for why there is reasonable assurance that the current licensing basis intended function(s) of the fire water storage tank will be met during the period of extended operation.

2. If adhesion testing will not be conducted, state the basis for why there is reasonable assurance that the current licensing basis intended function(s) of the fire water storage tank will be met during the period of extended operation.

Response to RAI 3.0.3-1-FWS-2

1. NFPA 25 (2011 Edition), Section 9.2.7 Item (6) states, "Tanks with flat bottoms shall be vacuum-box tested." Section 9.2.7 Item (6) is not applicable to the fire water storage tanks at GGNS because the bottom of the fire water tanks is domed. Since the NFPA provision does not require vacuum box testing for domed tank bottoms, this is not considered an exception. As described in LRA Section B.1.21 as revised by the Entergy letter dated May 13, 2014, Entergy has committed to performing the following tests in the event there is evidence of pitting, corrosion, or coating failure found during period tank internal inspections.

   - Dry film thickness measurements at random locations to determine the overall coating thickness as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.
   - Spot wet-sponge test to detect pinholes. cracks. or other compromises in the coating when specified in NFPA-25 (2011 Edition) Section 9.2.6.4.
   - Nondestructive ultrasonic testing to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.
   - Testing the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.

   These testing activities provide reasonable assurance that the fire water storage tanks will remain capable of performing their intended functions during the period of extended operation.

2. The fire water tanks at GGNS have a capacity of 300,000 gallons with continuous monitoring through instrumentation with alarms in the control room. Although a few pits have been detected in the fire water tanks in the past, an inspection of the tanks in 2014 found the repaired areas and the remainder of the interior coating in good condition. The adhesion testing suggested in NFPA 25 (2011 Edition), Section 9.2.7, Item (1) (ASTM D 3359) is a destructive test that requires cutting an 'X' in the coating down to the substrate in a number of locations. According to ASTM D 3359 this testing of coating adhesion is not a precise test of coating adhesion, and it is not unexpected to get different test results from different personnel performing the same test. Different test results occur because the test depends on (1) the peel angle and rate, (2) subjective visual assessment of any coating removed, and (3) humidity and temperature. The repair of the coating adhesion test locations would require a specific humidity and temperature, which may cause the station to

enter Technical Requirements Manual (TRM) limiting condition for operation (LCO) 6.2.2 (i.e., tank being out of service for repair greater than seven days). For these reasons, the adhesion test is not considered a prudent inspection method.

As indicated in the Entergy letter dated May 13, 2014, in response to NRC request for additional information, the following tests will be performed if a fire water storage tank exhibits signs of interior pitting, corrosion, or coating failure during periodic visual inspections conducted at least once every five years.

- Dry film thickness measurements at random locations to determine the overall coating thickness as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.
- Spot wet-sponge test to detect pinholes. cracks. or other compromises in the coating when specified in NFPA-25 (2011 Edition) Section 9.2.6.4.
- Nondestructive ultrasonic testing to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.
- Testing the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.

These testing activities provide reasonable assurance that the fire water storage tanks will remain capable of performing their intended functions during the period of extended operation.

As a clarification, the four bullet items listed above are being revised in LRA Sections A.1.21. A.4, and B.1.2.1 to refer to the item number from Section 9.2.7, rather than to Section 9.2.6.4. Also, a reference to NFPA 25 Section 9.2.6.1.2 for inspection frequency is added to the enhancement for inspecting the fire water tank interior. Revisions to LRA Sections A.1.21. A.4, and B.1.21 are provided in Attachment 2.

RAI 3.0.3-1-FWS-3

Background:

Exception No. 7 for LRA Section B.1.21 dated May 13, 2014, states that full flow deluge valve testing for the deluge valves associated with the charcoal filters is not conducted. The footnote for the exception states that: (a) the deluge valves associated with the control room fresh air charcoal filters are trip tested, but not at full flow; and (b) the deluge systems associated with the auxiliary building standby containment cooling system and containment vent charcoal filters are not trip tested due to the potential for water damaging the charcoal in the filter units. An enhancement states that the nozzles are inspected when charcoal is replaced.

Issue:

The staff noted that NFPA 25 Section 13.4.3.2.2.5(A) states: "[w]here the nature of the protected property is such that water cannot be discharged, the nozzles or open sprinklers shall be inspected for correct orientation and the system tested with air to ensure that the nozzles are not obstructed." Therefore, testing could be conducted consistent with LR-ISG-2012-02 AMP XI.M27 without wetting charcoal filter media. It is not clear to the staff how it will be demonstrated that flow blockage is not occurring when either testing is conducted at less than full flow rate or inspections are conducted in lieu of flow testing.

Request:

1. State the basis for why full flow testing of deluge valves cannot be conducted in accordance with NFPA 25.

2. State the basis for why there is reasonable assurance that flow blockage will be detected when full flow deluge valve testing is not conducted.

Response to RAI 3.0.3-1-FWS-3

1. Full flow testing of the deluge valves associated with the charcoal filter units in accordance with NFPA 25 would result in wetting and the risk of damage to the charcoal filters. To implement the alternative specified in Section 13.4.3.2.2.5 (A) of NFPA 25, the Fire Water System Program procedures will be revised to perform air flow testing to ensure that the deluge nozzles are not obstructed.

   Revisions to LRA Sections A.1.21, A.4, and B.1.21 are provided in Attachment 2.

2. The flow testing specified in NFPA 25, Section 13.4.3.2.2.5(A), provides reasonable assurance that the deluge nozzles are unobstructed. This flow testing will inject compressed air just downstream of the deluge valve for the charcoal filter units and will monitor for flow through each deluge nozzle. The flow testing will be performed for the control room fresh air, auxiliary building standby gas, containment cooling system, and containment vent charcoal filter units each refueling cycle. Monitoring compressed air flow through the drain valves associated with the deluge valves, downstream piping, and nozzles inside the charcoal filtration units during testing every refueling cycle provides reasonable assurance that flow blockage, if any, will be detected.

RAI 3.0.3-1-FWS-4

Background:

An enhancement to LRA Section B.1.21 dated May 13, 2014, states that the Fire Water System program will be enhanced to include periodic inspections that will be performed by opening a flushing connection at the end of ***one*** [emphasis added by NRC] main in each structure containing in-scope water-based fire suppression systems.

Issue:

The staff notes that NFPA 25, Section 14.2.2 specifies an internal inspection of every other wet pipe system (in buildings with multiple wet pipe systems) and that the alternate systems (not inspected during the previous inspection) be inspected during the next inspection. Since the response only stated that one main in each structure will be opened, it is not clear whether there are multiple wet pipe systems in any of the structures containing in-scope fire water systems and, if so, whether all wet pipe systems will be inspected as stated in NFPA 25.

Request:

State whether there are multiple wet pipe systems in any of the structures containing in-scope fire water systems and, if there are, whether internal inspections will be conducted as stated in NFPA 25, Section 14.2.2, or provide the basis for not conducting the internal inspections on every other wet pipe system every 5 years.

Response to RAI 3.0.3-1-FWS-4

Each of the in-scope wet pipe sprinkler systems in the auxiliary building, control building and fire pump house are supplied by the respective building fire water loop, fabricated from the same material, and exposed to the same environment. There are six in-scope wet pipe sprinkler systems in the auxiliary building, five in-scope wet pipe sprinkler systems in the control building, and two in-scope wet pipe sprinkler systems in the fire pump house. The aging effects are expected to be the same in each in-scope wet pipe sprinkler system. The Fire Water System Program described in LRA Sections A.1.21 and B.1.21 will be revised to require internal inspections at the end of one fire main and the end of one branch line on two of the wet pipe systems in the auxiliary building, two of the wet pipe systems in the control building and one wet pipe system in the fire pump house every five (5) years. During each five-year period, different wet pipe sprinklers will be inspected such that all of the wet pipe sprinkler systems in the auxiliary and control buildings will be internally inspected every 15 years and in the fire pump house every 10 years. In the event internal obstructions are identified in a building wet pipe system, the number of inspections will be expanded to include all of the wet pipe sprinkler systems in that building. Performing the above inspections provides reasonable assurance that the wet pipe sprinkler systems will perform their intended function during the period of extended operation.

Revisions to LRA Sections A.1.21, A.4, and B.1.21 are provided in Attachment 2.

RAI 3.0.3-1-FWS-5

Background:

The "parameters monitored/inspected" and "detection of aging effects" program elements of LR-ISG-2012-02 AMP XI.M27 state that, when visual inspections are used to detect loss of material, the inspection technique should be capable of detecting surface irregularities that could indicate wall loss to below nominal pipe wall thickness due to corrosion and corrosion product deposition and, where such irregularities are detected, follow-up volumetric wall thickness examinations are performed.

Issue:

The staff noted that there are no exceptions or enhancements associated with this recommendation.

Request:

Clarify whether this recommendation in LR-ISG-2012-02 AMP XI.M27 is incorporated into the program, and if not, provide the basis for the exception.

Response to RAI 3.0.3-1-FWS-5

The recommendation in LR-ISG-2012-02, AMPXI.M27, to use visual inspection techniques that are capable of detecting surface irregularities that could indicate wall loss to below nominal pipe wall thickness due to excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond the normal oxide layer will be incorporated into the program. Visual inspection results that identify excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond a normal oxide layer will be entered into the corrective action program, and follow-up volumetric wall thickness examination will be performed.

Revisions to LRA Sections A.1.21, A.4, and B.1.21 are provided in Attachment 2.

RAI 3.0.3-1-FWS-6

Background:

The "parameters monitored/inspected" and "detection of aging effects" program elements of LR-ISG-2012-02 AMP XI.M27 state that periodic visual or flow tests and volumetric inspections should be conducted on portions of water-based fire protection system components that have been wetted but are normally dry, such as dry-pipe or preaction sprinkler system piping and valves.

Issue:

The staff noted that there are no exceptions or enhancements associated with this recommendation.

Request:

Clarify whether this recommendation in LR-ISG-2012-02 AMP XI.M27 is incorporated into the program, and if not, provide the basis for the exception.

Response to RAI 3.0.3-1-FWS-6

No exception is being taken to this recommendation. The response to RAI 3.0.3-1-FWS-3 addresses air flow testing of in-scope dry fire water piping downstream of the deluge valves. The enhancement to the program described in LRA Section B.1.21 in Entergy letter to the NRC dated May 13, 2014 (GNRO 2014-000030) that reads, "Revise Fire Water System Program procedures to periodically open a flushing connection at the end of one main and remove a component such as a sprinkler toward the end of one branch line five years prior to the PEO, and every five years during the PEO to perform a visual inspection in accordance with NFPA 25 (2011 Edition) Section 14.2.1" was intended to address the inspection of in-scope wet and dry fire water piping, including piping downstream of the preaction valves. The enhancement has been revised to read, "Revise Fire Water System Program procedures to periodically open a flushing connection at the end of a main and remove a component such as a sprinkler toward the end of one branch line for piping associated with preaction, dry pipe and wet pipe systems to perform a visual inspection in accordance with NFPA 25 (2011 Edition) Section 14.2.1. Inspect preaction and dry pipe system piping at least once every five years. Inspect piping in

one-third of the wet pipe systems at least once every five years such that piping in all wet pipe systems is inspected at least once every fifteen years." Volumetric examinations of wet and dry piping are addressed in the response to RAI 3.0.3-1-FWS- 5.

The following additional enhancement has been added to LRA Sections A.1.21 and B.1.21.

> Revise Fire Water System Program procedures to inspect the normally dry fire suppression piping and piping components with a 10 CFR 54.4(a)(3) intended function that may be wetted to ensure that the piping does not collect water. In the event areas are identified that collect water, perform the following augmented tests and inspections to ensure that flow blockage has not occurred.
>
> 1. In each 5-year interval beginning with the 5-year period before the period of extended operation, perform either (a) a flow test or flush sufficient to detect potential flow blockage, or (b) visual inspections on 100 percent of the internal surface of piping segments that allow water to collect.
>
> 2. In each 5-year interval during the period of extended operation, perform volumetric wall thickness inspections on 20 percent of the length of piping segments that allow water to collect. Data points are obtained to the extent that potential degraded conditions can be identified (e.g., general corrosion, MIC). The 20 percent of piping inspected in each 5-year interval should be in different locations than piping inspected in previous intervals.
>
> If the results of a 100 percent internal visual inspection are acceptable and the segment is not subsequently wetted, no further augmented tests or inspections are necessary.

Revisions to LRA Sections A.1.21, A.4, and B.1.21 are provided in Attachment 2.

RAI 3.0.3-1-FWS-7

Background:

LRA Section A.1.21 does not state: (a) NFPA 25 (2011 Edition) as a reference for testing and inspections; (b) that testing or replacement of sprinklers that have been in place for 50 years will be performed in accordance with the 2011 Edition of NFPA 25; and (c) that periodic visual or flow tests and volumetric inspections should be conducted on portions of water-based fire protection system components that have been wetted but are normally dry.

Issue:

The licensing basis for this program for the period of extended operation may not be adequate if this information is not incorporated into the updated final safety analysis report (UFSAR) supplement.

Request:

Provide justification for why LRA Section A.1.21 sufficiently describes the licensing bases for the activities described above.

Response to RAI 3.0.3-1-FWS-7

LRA Section A.1.21 addresses point (a) in the RAI through explicitly describing the testing and inspections from NFPA 25 that are credited for managing the effects of aging on the fire water system. References are included to sections from NFPA 25 in cases where the referenced NFPA section provides additional detail necessary to adequately describe the activity. Point (b) is addressed with a specific reference to the applicable NFPA 25 section in the enhancement that reads, "Revise Fire Water System Program procedures to ensure sprinkler heads are tested or replaced in accordance with NFPA-25 (2011 Edition), Section 5.3.1." In regard to point (c) in the RAI, LRA Section A.1.21 as revised in response to RAIs 3.0.3-1-FWS-3, FWS-5, and FWS-6 in this letter addresses the visual inspections, volumetric inspections, and flow tests on normally dry portions of water-based fire protection systems that have been wetted.

RAI 3.0.3-2a

Background:

1. The response to RAI 3.0.3-2 dated May 13, 2014, states that subsequent coating inspections will be based on the initial inspection results. The response further indicates that, if no indications are found during inspection of one train, the redundant train need not be inspected during that inspection interval, and the subsequent inspection would be on the redundant train.

2. The response to RAI 3.0.3-2 dated May 13, 2014, states, "[a]n individual knowledgeable and experienced in nuclear coatings work will prepare a coating report." In addition, LRA Section B.1.35 was revised to state that the results of previous inspections are reviewed prior to conducting a coating inspection.

3. The response to RAI 3.0.3-2 dated May 13, 2014, states that if base metal is exposed and accompanied by accelerated corrosion, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component can perform its current licensing basis intended function until the next inspection.

4. The response to RAI 3.0.3-2 dated May 13, 2014, states, "[c]orrective actions for unacceptable inspection findings will be determined in accordance with the Grand Gulf Nuclear Station 10 CFR 50, Appendix B, Corrective Action Program (CAP)."

5. LRA Section B.1.35 lists the program elements that are required to be enhanced for the Periodic Surveillance and Preventive Maintenance Program. The "monitoring and trending" program element includes new requirements necessary to effectively manage loss of coating integrity; however, this program element is not listed in the list of affected program elements.

Issue:

1. Redundant trains do not always have identical coatings installed to the same requirements. Redundant trains may also operate with different operating conditions due to factors such as flow distributions within headers. In addition, turbulent conditions may have different impacts in redundant trains due to localized differences in configuration (e.g., distance away from a control valve). As such, the proposal to not inspect redundant trains during that inspection interval lacks sufficient justification for the staff to conclude that there is reasonable assurance that the current licensing basis intended function(s) of in-scope components will be met.

2. In regard to monitoring and trending of the results of coating inspections:

   a. Regulatory Guide (RG) 1.54, "Service Level I, II, and III Protective Coatings Applied to Nuclear Plants," provides the staff position for training and qualification of individuals involved in coating activities. ASTM D7108, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," referenced in RG 1.54, provides unique requirements for individuals that perform actions beyond inspecting coatings. These actions include resolving and dispositioning issues that arise during the performance of coating and lining work, and generating written assessment reports. As used in the response to the RAI, the term "an individual knowledgeable and experienced in nuclear coatings work" lacks sufficient specificity for the staff to conclude that the individual who will prepare coating reports will be appropriately qualified to perform the task.

   b. The staff noted that, while the Periodic Surveillance and Maintenance Program was revised to state that the results of previous inspections are reviewed prior to conducting a coating inspection, neither the Fire Water System nor Service Water Integrity programs include this detail.

   c. The staff also noted that the Fire Water System program does not identify what information will be included in the inspection reports.

   [d.] Coatings work, similar to welding and other processes, is generally classified as a special process because the only way to provide reasonable assurance that the coated component will perform its intended function and not impact downstream in-scope components is to monitor the process. As stated in 10 CFR Part 50 Appendix B Criterion IX, "Control of Special Processes," personnel involved in special processes should be qualified. Likewise, ISO [International Organization for Standardization] 9001-2008, "Quality Management System Requirements," paragraph 7.5.2 states that personnel involved in such processes should be qualified. The staff noted that the qualification of individuals conducting coatings inspection related activities (e.g., inspections, evaluation of inspection findings) is not reflected in the current licensing basis.

3. The staff noted that the RAI response states that a volumetric examination will be performed if there is evidence of accelerated corrosion; however, if coatings are credited for corrosion prevention (e.g., corrosion allowance in design calculations is zero, the "preventive actions" program element credited the coating) and the base metal has been exposed or it is beneath a blister, the component's base material in the vicinity of the degraded coating should be examined to determine if the minimum wall thickness is met and will be met until the next inspection. The staff lacks sufficient information to conclude that "evidence of

accelerated corrosion" is an acceptable criterion for conducting followup volumetric examinations.

The staff also noted that the Fire Water System Program does not include acceptance criteria for loss of coating integrity.

4. The staff lacks sufficient information to evaluate the adequacy of corrective actions associated with loss of coating integrity. For example, the response does not state whether coatings that do not meet the acceptance criteria will be repaired or replaced and what testing or examination will be conducted to ensure that the extent of repaired or replaced coatings encompasses sound coating material.

5. By not listing the "monitoring and trending" program element as one of the program elements requiring enhancement for the Periodic Surveillance and Preventive Program, the staff cannot be certain that the new requirements will be incorporated into plant-specific implementing documents.

Request:

1. Provide a justification for why inspection results on one train are sufficiently representative of the coating condition on redundant train(s) such that it is acceptable to extend the inspection interval for redundant train(s) when no indications are found during the inspection of the initial train.

2. Respond to the following:

   a. State the specific qualifications for the individual that prepares the coating report for the Periodic Surveillance and Preventive Maintenance, Fire Water System, and Service Water Integrity programs; update the UFSAR Supplements accordingly.

   b. State how the results of coatings inspections will be monitored and trended for the Service Water Integrity Program.

   c. State how the results of coatings inspections will be monitored, trended, and reported for the Fire Water System Program.

   [d.] State whether qualifications for individuals conducting coatings inspection activities, in all three of the above programs, will be reflected in the current licensing basis. If the licensing basis will not include qualification requirements, state the basis for why there will be adequate controls to ensure that the appropriate personnel will conduct coatings inspection related activities.

3. State the basis for why conducting volumetric wall thickness examinations of components only when the extent of loss of material is characterized as "accelerated corrosion" is sufficient to provide reasonable assurance that the current licensing basis intended function(s) of components with exposed base metal or base metal in the vicinity of a blister will be met. State the acceptance criteria that will be used by the Fire Water System Program for loss of coating integrity.

4. State the specific corrective actions that will be taken when inspection results do not meet acceptance criteria.

5. Clarify whether the Enhancements section of LRA Section B.1.35 will include the "monitoring and trending" program element as being an "Element Affected." If not, state how it will be ensured that these new requirements will be incorporated into plant-specific implementing documents.

Response to RAI 3.0.3-2a

1. LRA sections describing the Periodic Surveillance and Preventive Maintenance Program (PSPM) and the Service Water Integrity Program inspections of redundant trains are revised to clarify that the redundant train must have the same coating and to add that the redundant train has no turbulent flow. Under these conditions, inspection results on one train are representative of the coating condition on redundant train(s) such that it is acceptable to extend the inspection interval for redundant train(s) when no indications are found during the inspection of the initial train.

   Revisions to LRA Sections A.1.35, A.1.41, A.4, B.1.35, and B.1.41 are provided in Attachment 2.

2.a LRA Sections A.1.21, A.1.35, A.1.41, A.4, B.1.21, B.1.35, and B.1.41 are revised to state that post-inspection reports will be prepared by a nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist."

   Revisions to these LRA sections are provided in Attachment 2.

2.b An enhancement is added to the Service Water Integrity Program for monitoring and trending activities for coating inspections that specifically states that results of previous inspections are reviewed prior to conducting a coating inspection. The results of previous inspections are used to determine the extent of changes in the condition of the coating over time.

   In LRA Section B.1.35 and B.1.41, descriptions of the content of the report are relocated to the monitoring and trending element.

   Revisions to LRA Section A.1.41, A.4, B.1.35, and B.1.41 are provided in Attachment 2.

2.c An enhancement is added to the Fire Water System Program for monitoring and trending activities for coating inspections that specifically states that results of previous inspections are reviewed prior to conducting a coating inspection. The results of previous inspections are used to determine the extent of changes in the condition of the coating over time.

   Consistent with the Service Water Integrity Program and the Periodic Surveillance and Preventive Maintenance Program, the Fire Water System Program coating inspection reports will include a list of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity. The description of the Fire Water System Program is revised to include this information.

   Revisions to LRA Section A.1.21, A.4, and B.1.21 are provided in Attachment 2.

2[d]: The GGNS UFSAR Supplement, LRA Section A.1, is being revised for all three programs to state the qualifications for individuals conducting coatings inspection activities. See the response to 2.a above.

3. At GGNS, coatings are not credited for corrosion prevention in the evaluation of aging affects requiring management.

   Acceptance criteria for the Fire Water System Program for loss of coating integrity are revised to be the same as the acceptance criteria in the PSPM Program and the Service Water Integrity Program.

   The discussion of corrective actions taken when coatings do not meet the acceptance criteria has been revised in descriptions of the Fire Water System, PSPM, and Service Water Integrity Programs. The phrase "accelerated corrosion" is revised to "corrosion." See the response to Item 4.

   Revisions to LRA Sections A.1.21, A.1.35, A.1.41, A.4, B.1.21, B.1.35 and B.1.41 are provided in Attachment 2.

4. In the response to RAI 3.0.3-2, a discussion of corrective actions was included in the response to item 7, acceptance criteria. The LRA revisions included this information as part of the acceptance criteria in the discussion of the Service Water Integrity Program and the PSPM Program. This discussion included examinations to determine the extent of the condition. The Fire Water System Program description was revised to include corrective actions based on NFPA 25, (2011 Edition), but these were included in the section for detection of aging effects. The Appendix B descriptions in the LRA are revised to reorganize the descriptions such that corrective actions are more clearly identified in the corrective action program element.

   In the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as an adhesion test will be performed. Coatings that do not meet acceptance criteria will be repaired or replaced. Areas requiring repair or replacement will be prioritized into areas that must be repaired before returning the system to service and areas where repair can be postponed to the next refueling outage.

   For the Service Water Integrity and the PSPM Programs, in the event the base metal is exposed and the visual inspection identifies corrosion, this inspection finding will be entered into the Corrective Action Program. An evaluation will confirm the component remains acceptable for continued service. As necessary, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component remains capable of performing its intended function. If repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and confirm the component remains acceptable for continued service until the next inspection or repair opportunity.

   For the Fire Water System Program, corrective actions include the following actions specified in Section 9.2.7 of NFPA-25 (2011 Edition) if a coating defect is identified (added to LRA Sections A.1.21 and B.1.21 by GNRO-2014/00030, letter dated May 13, 2014).

   - Take dry film thickness measurements at random locations to determine the overall coating thickness as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.

- Perform a spot wet-sponge test to detect pinholes. cracks. or other compromises in the coating when specified in NFPA-25 (2011 Edition) Section 9.2.6.4.
- Take nondestructive ultrasonic readings to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.
- Test the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.6.4.

Revisions to LRA Sections A.1.21, A.1.35, A.1.41, A.4, B.1.21, B.1.35, and B.1.41 are provided in Attachment 2.

5. LRA Section B.1.35 is revised to add "5. Monitoring and Trending" to the "Elements Affected" list in the response to request 2.b. above.

During the review for this RAI response, Table 3.3.2-12, Fire Protection –Water System, Summary of Aging Management Evaluation, was identified as needing a line item for the fire water tank for the material, "Metal with Service Level III or other internal coating," with a raw water internal environment. The revision to Table 3.3.2-12 is provided in Attachment 2.

The enhancement given for the PSPM Program in Section A.1.35, A.4, and B.1.35 is amended to be more consistently worded for the three sections.

Attachment 2 to

GNRO-2014/00076

Changes to LRA due to Responses to Set 51 RAIs

Revisions to LRA text and tables are provided below with additions underlined and deletions marked through.

Add the following line to **LRA Table 3.3.2-12, Fire Protection – Water System, Summary of Aging Management Evaluation**

Table 3.3.2-12: Fire Protection – Water System

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Tank	Pressure boundary	Metal with Service Level III or other internal coating	Raw water (int)	Loss of coating integrity	Fire Water System	--	--	H

Add the following line to **Table 3.3.2-19-16, Standby Service Water System Nonsafety-Related Components Affecting Safety-Related Systems Summary of Aging Management Evaluation**

Table 3.3.2-19-16: Standby Service Water System [10 CFR 54.4(a)(2)]

Component Type	Intended Function	Material	Environment	Aging Effect Requiring Management	Aging Management Program	NUREG-1801 Item	Table 1 Item	Notes
Insulated piping, piping components	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External Surfaces Monitoring	--	--	H, 310

Add the following lines to **Table 3.3.2-19-19, Plant Service Water System Nonsafety-Related Components Affecting Safety-Related Systems Summary of Aging Management Evaluation**

Table 3.3.2-19-19: Plant Service Water System [10 CFR 54.4(a)(2)]								
Component Type	**Intended Function**	**Material**	**Environment**	**Aging Effect Requiring Management**	**Aging Management Program**	**NUREG-1801 Item**	**Table 1 Item**	**Notes**
Insulated piping, piping components	Pressure boundary	Carbon steel	Condensation (ext)	Loss of material	External Surfaces Monitoring	--	--	H, 310
Insulated piping, piping components	Pressure boundary	Stainless steel	Condensation (ext)	Loss of material	External Surfaces Monitoring	--	--	H, 310
Insulated piping, piping components	Pressure boundary	Stainless steel	Condensation (ext)	Cracking	External Surfaces Monitoring	--	--	H, 310

A.1.21 Fire Water System Program

The Fire Water System Program manages loss of material, loss of coating integrity, and fouling for components in fire protection systems using preventive, inspection, and monitoring activities, including periodic full-flow flush tests, system performance testing, and testing or replacement of sprinkler heads. Applicable industry standards and guidance documents, including NFPA codes, are used to delineate the program. The program includes acceptance criteria for the water-based fire protection system to maintain required pressure, and acceptance criteria will be enhanced to verify no unacceptable degradation. Corrective action is initiated upon loss of system operating pressure, which is monitored continuously.

The Fire Water System Program will be enhanced as follows.

- Revise Fire Water System Program procedures to specify that the results of visual inspections that identify excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond a normal oxide layer will be entered into the corrective action program and that follow-up volumetric wall thickness examination will be performed as a corrective action.

- Revise Fire Water System Program procedures to perform a flow blockage evaluation if during main drain testing the flowing pressure drops more than 10 percent from the previous test at the same location.

- Revise Fire Water System Program procedures to perform air flow testing to ensure there are no obstructions downstream of the deluge valves for control room fresh air, auxiliary building standby gas, containment cooling system, and containment vent charcoal filter units each refueling cycle.

- Revise Fire Water System Program procedures to require internal inspections at the end of one fire main and the end of one branch line on two of the wet pipe systems in the auxiliary building, two of the wet pipe systems in the control building, and one wet pipe system in the fire pump house every five years. During each five-year internal inspection period, inspect different wet pipe sprinklers such that internal inspections are performed on all of the wet pipe sprinkler systems in the auxiliary and control buildings every 15 years and in the fire pump house every 10 years. In the event internal obstructions are identified in a building wet pipe system, expand the number of inspections to include all of the wet pipe sprinkler systems in that building.

- Revise Fire Water System Program procedures to periodically open a flushing connection at the end of ~~one~~ a main and remove a component such as a sprinkler toward the end of one branch line for piping associated with preaction, dry pipe and wet pipe systems~~five years prior to the PEO, and every five years during the PEO~~ to perform a visual inspection in accordance with NFPA 25 (2011 Edition) Section 14.2.1. Inspect preaction and dry pipe system piping at least once every five years. Inspect piping in one-third of the wet pipe systems at least once every five years such that piping in all wet pipe systems is inspected at least once every fifteen years.

- Revise Fire Water System Program procedures to inspect the normally dry fire suppression piping and piping components with a 10 CFR 54.4(a)(3) intended function that may be wetted to ensure that the piping does not collect water. In the event areas

are identified that collect water, perform the following augmented tests and inspections to ensure that flow blockage has not occurred.

- In each 5-year interval beginning with the 5-year period before the period of extended operation, perform either (a) a flow test or flush sufficient to detect potential flow blockage, or (b) visual inspections on 100 percent of the internal surface of piping segments that allow water to collect.

- In each 5-year interval during the period of extended operation, perform volumetric wall thickness inspections on 20 percent of the length of piping segments that allow water to collect. Data points are obtained to the extent that potential degraded conditions can be identified (e.g., general corrosion, MIC). The 20 percent of piping inspected in each 5-year interval should be in different locations than piping inspected in previous intervals.

If the results of a 100 percent internal visual inspection are acceptable and the segment is not subsequently wetted, no further augmented tests or inspections are necessary.

Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks at the frequency specified by NFPA 25 Section 9.2.6.1.2 to include the following.

- Testing for possible voids beneath the tank.
- Inspection of the vortex breaker.
- Inspection of internal coatings.
- Coating inspections and documentation and review of inspection results are performed by qualified personnel.
  - Individuals performing coating inspections are certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants."
  - A nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," will evaluate inspection findings and prepare post-inspection reports.
- A review of previous coating inspection results is performed prior to conducting a coating inspection.
- The coating inspection report will include a list of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity.

- Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following ~~T~~testing specified by Section 9.2.7 of NFPA-25 (2011 Edition) if a coating defect is identified.

    - Take dry film thickness measurements at random locations to determine the overall coating thickness as specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 item (2).

    - Perform a spot wet-sponge test to detect pinholes, cracks, or other compromises in the coating when specified in NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (3).

    - Take nondestructive ultrasonic readings to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (4).

    - Test~~ing~~ the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (5).

- Revise the Fire Water System Program procedures to add acceptance criteria for loss of coating integrity: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. Coatings that do not meet the acceptance criteria will be repaired or replaced.

A.1.35 Periodic Surveillance and Preventive Maintenance Program

Inspections occur at least once every five years during the period of extended operation, with the exception of inspections for MIC and coating inspections, for which frequency is based on inspection results ~~coating condition~~. Visual or other NDE inspections of components in the low pressure core spray, residual heat removal, pressure relief, reactor core isolation cooling, high pressure core spray, and floor and equipment drains systems and the containment building gaskets/seals are performed every five years. Visual or other NDE inspections of a representative sample of internal surfaces of components in the control rod drive, circulating water, and floor and equipment drains systems are performed every five years. UT or RT ~~other NDE~~ wall thickness measurements of selected components of the circulating water, standby service water, ~~component cooling water,~~ plant service water, and fire protection systems are performed periodically as necessary to assure minimum pipe wall thickness is maintained. The most susceptible locations will be selected for inspection based on pipe configuration, flow conditions, and operating history. A minimum of five MIC degradation inspections in the collective set of systems will be performed per cycle until MIC no longer meets the criteria for recurring internal corrosion. The scope of MIC examinations will be expanded if substantial MIC is detected during inspections. Scope expansion includes consideration of other locations for additional sampling such as similar components in the same or redundant trains. Substantial MIC is considered an increased rate of detection of new MIC sites, increased rates of wall thinning at known sites, or unexpected piping wall loss that results in wall thickness near or below code minimum wall thickness.

During the 10-year period prior to the period of extended operation, visual inspections will be performed of coated internal surfaces. Subsequent coating inspections will be performed based on inspection results as follows.

i. If no peeling, delamination, blisters, or rusting are observed, and any cracking and flaking has been found acceptable, subsequent inspections will be performed at least once every 6 years. If the coating is inspected on one train and no indications are found, and if the redundant train has the same coating ~~on~~ and turbulent flow is not present, then the redundant train need not be inspected during that inspection interval.

Individuals performing coating inspections are certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants. ~~Evaluators of inspection findings are~~ A nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist~~.~~," will evaluate inspection findings and prepare post-inspection reports. ~~An individual knowledgeable and experienced in nuclear coatings work will prepare a~~

Coating inspection reports ~~that~~ will include~~s a~~ lists of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity.

Loss of coating integrity acceptance criteria are (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. In the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as knife adhesion test~~,~~ or adhesion test will be performed. Coatings that do not meet the acceptance criteria will be repaired or replaced.

In the event the base metal is exposed and the visual inspection identifies ~~accelerated~~ corrosion, this inspection finding will be entered into the Corrective Action Program. An evaluation will confirm the component remains acceptable for continued service. As necessary, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component ~~can~~ remains capable of performing its intended function. If repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and confirm the component remains acceptable for continued service until the next inspection or repair opportunity.

- Piping components of the circulating water, standby service water, ~~component cooling water,~~ plant service water, and fire protection systems.

The Periodic Surveillance and Preventive Maintenance Program will be enhanced as follows.

Revise program guidance documents as necessary to include all activities provided in the program description above ~~assure that the effects of aging will be managed such that~~

~~applicable components will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation.~~

A.1.41 Service Water Integrity Program

Subsequent coating inspections will be performed based on inspection results as follows.

i. If no peeling, delamination, blisters, or rusting are observed, and any cracking and flaking has been found acceptable, subsequent inspections will be performed at least once every 6 years. If the coating is inspected on one train and no indications are found, and if the redundant train has the same coating ~~on~~ and turbulent flow is not present, then the redundant train need not be inspected during that inspection interval.

The Service Water Integrity Program will be enhanced as follows.

...

- Revise Service Water Integrity Program documents to include visual inspections for loss of coating Integrity during the 10-year period prior to the period of extended operation. Include provisions to specify subsequent coating inspections based on inspection results as follows.

  i. If no peeling, delamination, blisters, or rusting are observed, and any cracking and flaking has been found acceptable, subsequent inspections will be performed at least once every 6 years. If the coating is inspected on one train and no indications are found, and if the redundant train has the same coating ~~on~~ and turbulent flow is not present, then the redundant train need not be inspected during that inspection interval....

- Revise Service Water Integrity Program documents to include the following coating integrity acceptance criteria: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are ~~completive~~ completely surrounded by sound coating bonded to the surface.

- Revise Service Water Integrity Program documents to include the following coating integrity corrective actions: In the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as knife adhesion test or adhesion test will be performed. Coatings that do not meet the acceptance criteria will be repaired or replaced. In the event the base metal is exposed and the visual inspection identifies ~~accelerated~~ corrosion, this inspection finding will be entered into the Corrective Action Program. An evaluation will confirm the component remains acceptable for continued service. As necessary, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component ~~can~~ remains capable of performing its intended function. If repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and

confirm the component remains acceptable for continued service until the next inspection or repair opportunity.

- Revise Service Water Integrity Program documents to specify a review of previous coating inspection results prior to conducting a coating inspection.

- Revise Service Water Integrity Program procedures to ensure coating inspections are performed by individuals certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants~~," and that subsequent evaluation of inspection findings is conducted by a nuclear coatings subject matter expert qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist~~."

- Revise Service Water Integrity Program procedures to ensure that a nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," will evaluate inspection findings and prepare post-inspection reports. ~~an individual knowledgeable and experienced in nuclear coatings work will prepare a~~

- Revise Service Water Integrity Program documents to state that coating inspection report~~s that~~ will include~~s a~~ list~~s~~ of locations identified with coating deterioration including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to the next inspection or repair opportunity.

A.4 LICENSE RENEWAL COMMITMENT LIST

ITEM NUMBER	COMMITMENT	LRA SECTION	IMPLEMENTATION SCHEDULE	SOURCE
12	... Revise Fire Water System Program procedures to specify that the results of visual inspections that identify excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond a normal oxide layer will be entered into the corrective action program and that follow-up volumetric wall thickness examination will be performed as a corrective action. Revise Fire Water System Program procedures to perform a flow blockage evaluation if during main drain testing the flowing pressure drops more than 10 percent from the previous test at the same location. Revise Fire Water System Program procedures to perform air flow testing to ensure there are no obstructions downstream of the deluge valves for control room fresh air, auxiliary building standby gas, containment cooling system, and containment vent charcoal filter units each refueling cycle. Revise Fire Water System Program procedures to require internal inspections at the end of one fire main and the end of one branch line on two of the wet pipe systems in the auxiliary building, two of the wet pipe systems in the control building, and one wet pipe system in the fire pump house every five years. During each five-year period, inspect different wet pipe sprinklers such that internal inspections are performed on all of the wet pipe sprinkler systems in the auxiliary and control buildings every 15 years and in the fire pump house every 10 years. In the event internal obstructions are identified in a building wet pipe system, expand the number of inspections to include all of the wet pipe sprinkler systems in that building. Revise Fire Water System Program procedures to periodically open a flushing connection at the end of ~~one~~ a main and remove a component such as a sprinkler toward the end of one branch line for piping associated with preaction, dry pipe and wet pipe systems~~five years prior to the PEO,~~	B.1.21	Prior to May 1, 2024 or the end of the last refueling outage prior to November 1, 2024, whichever is later.	GNRO-2011/00093 GNRO-2014/00076

~~and every five years during the PEO~~ to perform a visual inspection in accordance with NFPA 25 (2011 Edition) Section 14.2.1. Inspect preaction and dry pipe system piping at least once every five years. Inspect piping in one-third of the wet pipe systems at least once every five years such that piping in all wet pipe systems is inspected at least once every fifteen years.

Revise Fire Water System Program procedures to inspect the normally dry fire suppression piping and piping components with a 10 CFR 54.4(a)(3) intended function that may be wetted to ensure that the piping does not collect water. In the event areas are identified that collect water, perform the following augmented tests and inspections to ensure that flow blockage has not occurred.

- In each 5-year interval beginning with the 5-year period before the period of extended operation, perform either (a) a flow test or flush sufficient to detect potential flow blockage, or (b) visual inspections on 100 percent of the internal surface of piping segments that allow water to collect.
- In each 5-year interval during the period of extended operation, perform volumetric wall thickness inspections on 20 percent of the length of piping segments that allow water to collect. Data points are obtained to the extent that potential degraded conditions can be identified (e.g., general corrosion, MIC). The 20 percent of piping inspected in each 5-year interval should be in different locations than piping inspected in previous intervals.

If the results of a 100 percent internal visual inspection are acceptable and the segment is not subsequently wetted, no further augmented tests or inspections are necessary.

Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks at the frequency specified by NFPA 25 Section 9.2.6.1.2 to include the following.

- Testing for possible voids beneath the tank.
- Inspection of the vortex breaker.
- Inspection of internal coatings.
- Coating inspections and documentation and review of inspection results are performed

by qualified personnel.

  - Individuals performing coating inspections are certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants."
  - A nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," will evaluate inspection findings and prepare post-inspection reports.

- A review of previous coating inspections is performed prior to conducting a coating inspection.
- The coating inspection report will include a list of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity.

Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following ~~T~~testing ~~required~~ specified by Section 9.2.7 of NFPA-25 (2011 Edition) if a coating defect is identified.

- Take dry film thickness measurements at random locations to determine the overall coating thickness when specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (2).
- ~~p~~Perform a spot wet-sponge test to detect pinholes, cracks, or other compromises in the coating when ~~required~~ specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (3).
- Take nondestructive ultrasonic readings to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (4).
- Test~~ing~~ the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011

	Edition) Section ~~9.2.6.4~~ 9.2.7 Item (5). Revise the Fire Water System Program procedures to add acceptance criteria for loss of coating integrity: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. Coatings that do not meet the acceptance criteria will be repaired or replaced.			
25	Enhance the Periodic Surveillance and Preventive Maintenance Program to revise program guidance documents as necessary to include all activities as described in ~~the table provided in~~ LRA Section B.1.35 ~~program description~~.	B.1.35	Prior to May 1, 2024 or the end of the last refueling outage prior to November 1, 2024, whichever is later.	GNRO-2011/00093 GNRO-2014/00076
35	Revise Service Water Integrity Program documents to include visual inspections for loss of coating integrity during the 10-year period prior to the period of extended operation. Include provisions to specify subsequent coating inspections based on inspection results as follows. i. If no peeling, delamination, blisters, or rusting are observed, and any cracking and flaking has been found acceptable, subsequent inspections will be performed at least once every 6 years. If the coating is inspected on one train and no indications are found, and if the redundant train has the same coating ~~on~~ and turbulent flow is not present, then the redundant train need not be inspected during that inspection interval. ... Revise the Service Water Integrity Program documents to include the following loss of coating integrity acceptance criteria: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. Revise Service Water Integrity Program documents to include the following coating integrity corrective actions:	B.1.41	Prior to May 1, 2024	GNRO-2013/00096 GNRO-2014/00030 GNRO-2014/00076

- In the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as knife adhesion test~~,~~ or adhesion test will be performed.

- In the event the base metal is exposed and the visual inspection identifies ~~accelerated~~ corrosion, this inspection finding will be entered into the Corrective Action Program. An evaluation will confirm the component remains acceptable for continued service. As necessary, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component ~~can~~ remains capable of performing its intended function. If repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and confirm the component remains acceptable for continued service until the next inspection or repair opportunity.

- Coatings that do not meet the acceptance criteria will be repaired or replaced.

Revise Service Water Integrity Program documents to specify a review of previous coating inspection results prior to conducting a coating inspection.

Revise Service Water Integrity Program procedures to ensure coating inspections are performed by individuals certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants~~," and that subsequent evaluation of inspection findings is conducted by a nuclear coatings subject matter expert qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a nuclear coatings specialist~~."

Revise Service Water Integrity Program procedures to ensure that a nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," will evaluate inspection findings and prepare post-inspection reports.~~an individual knowledgeable and experienced in nuclear coatings work will prepare a~~

Revise Service Water Integrity Program Procedures to state that the coating inspection report ~~that~~ will include~~s~~ a list of locations identified with coating deterioration including, where possible, photographs indexed to inspection

location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to the next inspection.

B.1.21 FIRE WATER SYSTEM

The Fire Water System Program is an existing program that manages loss of material, loss of coating integrity, and fouling for components in fire protection systems using preventive, inspection, and monitoring activities, including periodic full-flow flush tests and testing or replacement of sprinkler heads. Applicable industry standards and guidance documents, including NFPA codes, are used to delineate the program. The program includes acceptance criteria for the water-based fire protection system to maintain required pressure, and acceptance criteria will be enhanced to verify no unacceptable degradation. Corrective action is initiated upon loss of system operating pressure, which is monitored continuously.

Exceptions to NUREG-1801

Element Affected	Exception
4. Detection of Aging Effects	~~7. NFPA, Section 13.4.3.2.2, specifies full flow trip testing to ensure no flow blockage downstream of deluge valves. GGNS performs full flow deluge valve testing for the deluge systems associated with transformers. The deluge valves associate with the charcoal filters, the turbine building hydrogen seal oil and recirculation feed pump turbine (RFPT) lube oil reservoir are not full flow tested at GGNS.~~

Exception Notes:

~~7. The deluge valves associated with the auxiliary building standby charcoal filters containment cooling system charcoal filters, containment vent charcoal filter, RFPT lube oil reservoir turbine building hydrogen seal oil and control room fresh air charcoal filters are not trip tested at full flow. The turbine building hydrogen seal oil and RFPT LO reservoir deluge valves are only in scope for (a) (2) and are not required to meet the testing requirements of LR-ISG-2012-02. The deluge valves associated with the control room fresh air charcoal filters are trip tested, but not at full flow. The deluge systems associated with the auxiliary building standby containment cooling system, and containment vent charcoal filters have manually actuated deluge valves. Upon the detection of heat there is an alarm in the control room. Operating personnel must confirm the presence of a fire before manually opening the isolation valve and tripping the deluge valve for these charcoal filters. The deluge vales are not trip tested due to the potential for water damaging the charcoal in the filter units. The piping downstream of manual deluge trip valves is dry and the deluge nozzles are within the filter housing and not easily accessible. Since the nozzles in the charcoal filters are enclosed it is unlikely the orientation would change due to bumping or that bugs would build nests that could threaten performance of the spray nozzles. Nozzles are inspected when charcoal is replaced in the filters. (See enhancement to perform inspection of the nozzles when the charcoal is replaced.)~~

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Element Affected	Enhancement
3. Parameters Monitored or Inspected 4. Detection of Aging Effects	Revise Fire Water System Program procedures to specify that the results of visual inspections that identify excessive accumulation of corrosion products and appreciable localized corrosion (e.g., pitting) beyond a normal oxide layer will be entered into the corrective action program and that follow-up volumetric wall thickness examination will be performed as a corrective action.
4. Detection of Aging Effects	Revise Fire Water System Program procedures to perform a flow blockage evaluation if during main drain testing the flowing pressure drops more than 10 percent from the previous test at the same location.
4. Detection of Aging Effects	Revise Fire Water System Program procedures to perform air flow testing to ensure there are no obstructions downstream of the deluge valves for control room fresh air, auxiliary building standby gas, containment cooling system, and containment vent charcoal filter units each refueling cycle.
4. Detection of Aging Effects	Revise Fire Water System Program procedures to require internal inspections at the end of one fire main and the end of one branch line on two of the wet pipe systems in the auxiliary building, two of the wet pipe systems in the control building, and one wet pipe system in the fire pump house every five years. During each five-year period, inspect different wet pipe sprinklers such that internal inspections are performed on all of the wet pipe sprinkler systems in the auxiliary and control buildings every 15 years and in the fire pump house every 10 years. In the event internal obstructions are identified in a building wet pipe system, expand the number of inspections to include all of the wet pipe sprinkler systems in that building..
4. Detection of Aging Effects	Revise Fire Water System Program procedures to periodically open a flushing connection at the end of ~~one~~ a main and remove a component such as a sprinkler toward the end of one branch line for piping associated with preaction, dry pipe and wet pipe systems~~five years prior to the PEO, and every five years during the PEO~~ to perform a visual inspection in accordance with NFPA 25 (2011 Edition) Section 14.2.1. Inspect preaction and dry pipe system piping at least once every five years. Inspect piping in one-third of the wet pipe systems at least once every five years such that piping in all wet pipe systems is inspected at least once every fifteen years.

Element Affected	Enhancement
4. Detection of Aging Effects	Revise Fire Water System Program procedures to inspect normally dry fire suppression piping and piping components with a 10 CFR 54.4(a)(3) intended function that may be wetted to ensure that the piping does not collect water. In the event areas are identified that collect water, perform the following augmented tests and inspections to ensure that flow blockage has not occurred. • In each 5-year interval beginning with the 5-year period before the period of extended operation, perform either (a) a flow test or flush sufficient to detect potential flow blockage, or (b) visual inspections on 100 percent of the internal surface of piping segments that allow water to collect. • In each 5-year interval during the period of extended operation, perform volumetric wall thickness inspections on 20 percent of the length of piping segments that allow water to collect. Data points are obtained to the extent that potential degraded conditions can be identified (e.g., general corrosion, MIC). The 20 percent of piping inspected in each 5-year interval should be in different locations than piping inspected in previous intervals. If the results of a 100 percent internal visual inspection are acceptable and the segment is not subsequently wetted, no further augmented tests or inspections are necessary.

4. Detection of Aging Effects	Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks at the frequency specified by NFPA 25 Section 9.2.6.1.2 to include the following.
	
	• Testing for possible voids beneath the tank.
	• Inspection of the vortex breaker.
	• Inspection of internal coatings.
	• Coating inspections and documentation and review of inspection results are performed by qualified personnel.
	  o Individuals performing coating inspections are certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants."
	
	  o A nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," will evaluate inspection findings and prepare post-inspection reports.

Element Affected	Enhancement
5. Monitoring and Trending	Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following. • A review of previous coating inspections is performed prior to conducting a coating inspection. • The coating inspection report will include a list of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity.
7. Corrective Actions	Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following ~~T~~testing required by Section 9.2.7 of NFPA-25 (2011 Edition) if coating defect is identified. • Take dry film thickness measurements at random locations to determine the overall coating thickness when specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (2). • Perform a spot wet-sponge test to detect pinholes, cracks, or other compromises in the coating when required by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (3). • Take nondestructive ultrasonic readings to evaluate the wall thickness where there is evidence of pitting or corrosion as specified in NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (4). • Test~~ing~~ the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section ~~9.2.6.4~~ 9.2.7 Item (5).
6. Acceptance Criteria	Revise the Fire Water System Program procedures to add acceptance criteria for loss of coating integrity: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface.
7. Corrective Actions	Coatings that do not meet the acceptance criteria will be repaired or replaced.

B.1.35 PERIODIC SURVEILLANCE AND PREVENTIVE MAINTENANCE

Program Description

Circulating water system Standby service water system ~~Component cooling water system~~ Plant service water system Fire protection system	Perform wall thickness measurements using UT or RT ~~other suitable techniques~~ at selected locations to identify loss of material due to microbiologically influenced corrosion (MIC) in piping components of these systems that are included in the scope of license renewal. Select for inspection the most susceptible locations based on pipe configuration, flow conditions, and operating history ~~to represent a cross-section of potential MIC sites~~. Periodically review the selected locations to validate their relevance and usefulness, and modify accordingly. Compare wall thickness measurements to determine rates of corrosion degradation. Compare wall thickness measurements to code minimum wall thickness plus margin for corrosion during the refueling cycle (T_{marg}) to determine acceptability of the component for continued use. Perform subsequent wall thickness measurements as needed for each selected location based on the rate of corrosion and expected time to reach T_{marg}. Perform a minimum of five MIC degradation inspections in the collective set of systems per refueling cycle until MIC no longer meets the criteria for recurring internal corrosion. The scope of MIC examinations will be expanded if substantial MIC is detected during inspections. Scope expansion includes consideration of other locations for additional sampling such as similar components in the same or redundant trains. Substantial MIC is considered an increased rate of detection of new MIC sites, increased rates of wall thinning at known sites, or unexpected piping wall loss that results in wall thickness near or below code minimum wall thickness. Prior to the period of extended operation, select a method (or methods) from available technologies for inspecting internal surfaces of buried piping that provides suitable indication of piping wall thickness for a representative set of buried piping locations to supplement the set of selected inspection locations.

Evaluation

4. Detection of Aging Effects

Established techniques such as visual inspections are used. Each inspection occurs at least once every five years with the exception of inspections for MIC and coating inspections, for which frequency is based on inspection results ~~coating condition~~. The selection of components to be inspected will focus on locations which are most susceptible to aging, where practical. Established inspection methods to detect aging effects include: (1) visual inspections and manual flexing of elastomer components and (2) visual inspections or other NDE techniques for metallic components. Inspections are performed by personnel qualified to perform the inspections.

...

During the10-year period prior to the period of extended operation, visual inspections will be performed of coated internal surfaces. Subsequent coating inspections will be performed based on inspection results as follows.

i. If no peeling, delamination, blisters, or rusting are observed, and any cracking and flaking has been found acceptable, subsequent inspections will be performed at least once every 6 years. If the coating is inspected on one train and no indications are found, and if the redundant train has the same coating ~~on~~ and turbulent flow is not present, then the redundant train need not be inspected during that inspection interval....

Individuals performing coating inspections are certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants. ~~Evaluators of inspection findings are~~ A nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist~~.~~," will evaluate inspection findings and prepare post-inspection reports. ~~An individual knowledgeable and experienced in nuclear coatings work will prepare a coating report that includes a list of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity.~~

5. Monitoring and Trending

Prerequisites for coating inspections include review of the results of previous inspections. The coating inspection report will include a list of locations identified with coating degradation including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to a subsequent inspection or repair opportunity.

6. Acceptance Criteria

Loss of coating integrity acceptance criteria are (1) peeling and delamination are not acceptable, (2) cracking is not acceptance if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. ~~In the event peeling, delamination, cracking, or loss of adhesion is identified follow-up evaluations such as knife adhesion test, or adhesion test will be performed. In the event the base metal is exposed and the visual inspection identifies corrosion, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component can perform its intended function until the next inspection or repair opportunity.~~

7. Corrective Actions

Corrective actions, including root cause determination and prevention of recurrence, are implemented in accordance with requirements of 10 CFR Part 50, Appendix B.

In the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as knife adhesion test or adhesion test will be performed. Coatings that do not meet the acceptance criteria will be repaired or replaced. In the event the base metal is exposed and the visual inspection identifies corrosion, this inspection finding will be entered into the Corrective Action Program. An evaluation will confirm the component remains acceptable for continued service. As necessary, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component remains capable of performing its intended function. If repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and confirm the component remains acceptable for continued service until the next inspection or repair opportunity.

Enhancements

The following enhancements will be implemented prior to the period of extended operation.

Elements Affected	Enhancements
1. Scope of Program 3. Parameters Monitored or Inspected 4. Detection of Aging Effects 5. Monitoring and Trending 6. Acceptance Criteria 7. Corrective Actions	The Periodic Surveillance and Preventive Maintenance Program will be enhanced to revise program guidance documents as necessary to include all activities as described above ~~in the table provided in the program description~~.

B.1.41 SERVICE WATER INTEGRITY

Enhancements

Elements Affected	Enhancement
4. Detection of Aging Effects	Revise Service Water Integrity Program documents to include visual inspections for loss of coating ~~l~~integrity during the 10-year period prior to the period of extended operation. Include provisions to specify subsequent coating inspections based on inspection results as follows. i. If no peeling, delamination, blisters, or rusting are observed, and any cracking and flaking has been found acceptable, subsequent inspections will be performed at least once every 6 years. If the coating is inspected on one train and no indications are found, and if the redundant train has the same coating ~~on~~ and turbulent flow is not present, then the redundant train need not be inspected during that inspection interval....

4. Detection of Aging Effects	Revise Service Water Integrity Program Procedures to ensure coating inspections are performed by individuals certified to ANSI N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants,~~" and that subsequent evaluation of inspection findings is conducted by a nuclear coatings subject matter expert qualified in accordance with ASTM D 7108- 05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist~~." Revise Service Water Integrity Program Procedures to ensure that nuclear coatings specialist qualified in accordance with ASTM D 7108-05, "Standard Guide for Establishing Qualifications for a Nuclear Coatings Specialist," will evaluate inspection findings and prepare post-inspection reports. ~~an individual knowledgeable and experienced in nuclear coatings work will prepare a coating report that includes a list of locations identified with coating deterioration including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the s stem to service and areas where coating repair can be postponed to the next inspection.~~
5. Monitoring and Trending	Revise Service Water Integrity Program documents to specify a review of previous coating inspection results prior to conducting a coating inspection. Revise Service Water Integrity Program Procedures to state that the coating inspection report will include a list of locations identified with coating deterioration including, where possible, photographs indexed to inspection location, and a prioritization of the repair areas into areas that must be repaired before returning the system to service and areas where coating repair can be postponed to the next inspection.
6. Acceptance Criteria	Revise the Service Water Integrity Program documents to include the following loss of coating integrity acceptance criteria (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. ~~In the event peeling, delamination, cracking, or loss of adhesion is identified follow-up evaluations such as knife adhesion test, or adhesion test will be performed. In the event the base metal is exposed and the visual inspection identifies accelerated corrosion a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component can perform its intended function until the next projected inspection.~~
7. Corrective Actions	Revise the Service Water Integrity Program documents to include the following corrective actions: • In the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as

	knife adhesion test or adhesion test will be performed. • In the event the base metal is exposed and the visual inspection identifies corrosion, this inspection finding will be entered into the Corrective Action Program. An evaluation will confirm the component remains acceptable for continued service. As necessary, a volumetric examination will be performed to ensure there is sufficient wall thickness so that the component remains capable of performing its intended function. If repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and confirm the component remains acceptable for continued service until the next inspection or repair opportunity.