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NL-17-048

April 28, 2017

U.S. Nuclear Regulatory Commission
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SUBJECT: Supplemental Information Associated with NRC issuance of LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," for the Review of the Indian Point Nuclear Generating Unit Nos. 2 and 3 License Renewal Application
Indian Point Nuclear Generating Unit Nos. 2 and 3
Docket Nos. 50-247 and 50-286 (License Nos. DPR-26 and DPR-64)

REFERENCES:
1) Entergy Letter NL-07-039, "Indian Point Energy Center License Renewal Application" (April 23, 2007) (ML071210507)
2) NUREG-1801, "Generic Aging Lessons Learned (GALL) Report" Revision 1, published Sept. 2005
3) NRC License Renewal Interim Staff Guidance LR-ISG-2011-03, "Generic Aging Lessons Learned (GALL) Report Revision 2 AMP XI.M41, "Buried and Underground Piping and Tanks," issued July 26, 2012
4) NRC Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 (NUREG-1930, Supplement 2) published July 2015
5) NRC License Renewal Interim Staff Guidance LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," issued February 4, 2016

Dear Sir or Madam:

By letter dated April 23, 2007, and as later supplemented, Entergy Nuclear Operations, Inc. (Entergy) submitted a license renewal application (LRA) for the Indian Point Energy Center (IPEC) in accordance with 10 CFR Part 54 of the Nuclear Regulatory Commission's (NRC) regulations (Reference 1). Entergy submitted its LRA based on NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Revision 1 (Reference 2). In the LRA, Entergy compared the IPEC Buried Piping and Tanks Inspection Program to NUREG-1801, Section XI.M34.

In 2010, the NRC staff issued Revision 2 of NUREG-1801, which included updated recommendations for a buried and underground piping and tanks program in a new Section XI.M41. Those recommendations were refined in 2011 with issuance of Interim Staff Guidance LR-ISG-2011-03, "Generic Aging Lessons Learned (GALL) Report Revision 2 AMP XI.M41,

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"Buried and Underground Piping and Tanks," (Reference 3). As indicated in Supplement 2 to NUREG-1930, published in 2015 (Reference 4), the NRC staff evaluated elements of the IPEC program against recommendations published in ISG-2011-03 and concluded that Entergy had demonstrated that the effects of aging would be adequately managed during the period of extended operation.

On February 4, 2016, the NRC issued Interim Staff Guidance LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," (Reference 5) which replaced aging management program (AMP) XI.M41, "Buried and Underground Piping and Tanks," and the associated Updated Final Safety Analysis Report Summary Description in LR-ISG-2011-03, "Changes to the Generic Aging Lessons Learned (GALL) Report, Revision 2 Aging Management Program (AMP) XI.M41, 'Buried and Underground Piping and Tanks."

The NRC has requested Entergy to review and summarize IPEC's LRA position regarding LR-ISG-2015-01. Attachment 1 provides the results of the comparison of the IPEC Buried Piping and Tanks Inspection Program to the new recommendations promulgated in LR-ISG-2015-01. Attachment 2 shows the changes to the license renewal application that are warranted based on the results of this comparison.

There are no new commitments being made in this submittal.

If you have any questions, or require additional information, please contact Mr. Robert Walpole at 914-254-6710.

I declare under penalty of perjury that the foregoing is true and correct. Executed on 4/28, 2017.

Sincerely,

AJV/rl

Attachments:
1. Comparison of the IPEC Buried Piping and Tanks Inspection Program to the New Recommendations Promulgated in LR-ISG-2015-01
2. Changes to the License Renewal Application

cc: Mr. Daniel H. Dorman, Regional Administrator, NRC Region I
Mr. Sherwin E. Turk, NRC Office of General Counsel, Special Counsel
Mr. William Burton, NRC Senior Project Manager, Division of License Renewal
Mr. Richard V. Guzman, NRR Senior Project Manager
Ms. Bridget Frymire, New York State Department of Public Service
Mr. John B. Rhodes, President and CEO NYSERDA
NRC Resident Inspector's Office

ATTACHMENT 1 TO NL-17-048

Comparison of the IPEC Buried Piping and Tanks Inspection Program to the New Recommendations Promulgated in LR-ISG-2015-01

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3
DOCKET NOS. 50-247 AND 50-286

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Preventive Actions (Element 2.); Combined Table 2a and 2b in to one table XI.M41-1. Also added "There are no recommended preventive actions for titanium alloy, super austenitic stainless steels, and nickel alloy materials."	Combining the two tables is a formatting change that does not affect the IPEC program. The fact that there are no recommended preventive actions for titanium, super austenitic stainless or nickel alloys has no effect on the IPEC program. Changes to notes are discussed separately below. **No change is necessary.**
Preventive Actions (Element 2 c.) added: The cathodic protection system monitoring interval discussed in Section 10.3 of NACE SP0169-2007 may not be extended beyond one year.	This provision was in LR-ISG-2011-03. Entergy indicated in letter NL-13-098 that the cathodic protection system would be monitored every 12 months. For clarification, Entergy is adding this provision to Appendix A and Appendix B program descriptions.
Preventive Actions (Element 2 g.iii.c.) added: For fire mains installed in accordance with National Fire Protection Association NFPA 24, preventive actions beyond those in NFPA 24 need not be provided if...(c) an annual system leakage rate test is conducted.	This change added an option of crediting an annual fire water system leakage test in lieu of performing inspections on the system piping. Testing of fire protection systems as an alternative to inspections is not credited at IPEC. **No change is necessary.**
Preventive Actions (Element 2 e.iii) added: Depending on the environment, steel and stainless steel components can experience stress corrosion cracking dependent on the cathodic protection polarization level, temperature, pH, etc. If these conditions are applicable, the applicant describes the conditions and alternative cathodic protection levels in the LRA.	Cathodic protection levels are maintained as described in NL-13-132 and soil conditions are not aggressive such that cracking is not an aging effect requiring management. In addition, the stainless steel piping in the program operates at temperatures below 140 °F, which is the threshold for stress corrosion cracking in stainless steel. **No change is necessary.**

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Parameters Monitored or Inspected (Element 3 b.i., 3.b.ii., 3.b.iii., 3.b.iv.) added: b. Visual inspections of the external surface condition of the component should detect: i. loss of material due to general, pitting, crevice, and microbiologically-influenced corrosion (MIC) for aluminum alloy (MIC is not applicable for aluminum alloys), copper alloy, steel, stainless steel, super austenitic, and titanium alloy components; ii. loss of material due to wear for polymeric materials; iii. cracking, spalling, and corrosion or exposure of rebar for cementitious pipe; iv. cracking, blistering, change in color due to water absorption for high-density polyethylene (HDPE) and fiberglass components.	Item b of Element 3 indicates that surface condition is the parameter monitored with visual inspections. The IPEC program provides for visual inspections, for which surface condition is inherently the parameter monitored. There is no buried cementitious piping in scope for license renewal. In NL-09-088, IPEC identified buried plastic (PVC) piping as being in the scope of license renewal. The purpose of this piping in the plant drains system is to protect the RHR pump motors from internal flooding. The piping is routed below grade to a nearby storm drain manhole in the transformer yard. Operator actions are also used to prevent flooding of the RHR pump motors. The aging management review for this piping identified no aging effects due to the lack of stressors in a soil environment and the non-aggressive soil as confirmed by soil samples. This conclusion was confirmed by NRC staff as documented in NUREG-1930 Vol. 2 Section 3.3A.2.3.15. As a result, there are no polymeric components in the scope of the Buried Piping and Tanks Inspection Program. **No change is necessary.**

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Parameters Monitored or Inspected (Element 3 c) added: c. Volumetric nondestructive examination techniques as well as pit depth gages or calipers may be used for measuring wall thickness as long as: (a) they have been demonstrated to be effective for the material, environment, and conditions (e.g., remote methods) during the examination; and (b) they are capable of quantifying general wall thickness and the depth of pits. Wall thickness measurements are conducted to ensure that minimum wall thickness requirements are met.	LRA Section B.1.6 specifies that qualified inspection techniques be used and that volumetric examination be performed if significant wall loss is detected on underground piping. The direction for performing volumetric examination if significant wall loss is detected from buried piping will be added to LRA Section B.1.6.
Parameters Monitored or Inspected (Element 3 d.) added: Inspections for cracking due to stress corrosion cracking for steel, stainless steel and susceptible aluminum alloy materials utilize a method that has been demonstrated to be capable of detecting cracking. Coatings that: (a) are intact, well-adhered, and otherwise sound for the remaining inspection interval…do not have to be removed.	The IPEC soil is nonaggressive and cathodic protection levels are maintained as stated in LRA Section B.1.6 in letter NL-13-132. Therefore, the aging management review results did not identify cracking as an aging effect requiring management. IPEC does not credit the Buried Piping and Tanks Inspection Program to manage cracking. **No change is necessary.**

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Parameters Monitored or Inspected (Element 3 f.) added: When using alternatives to excavated direct visual examination of fire mains, appropriate inspection parameters are used in order to detect indications of fire main leakage. For example: i. During periodic flow test, a reduction in available flow rate. ii. For jockey pump monitoring, an increase in the number of pump starts or run time of the pump. iii. During annual system leakage rate testing an increase in unaccounted flow leak rates (i.e., the leakage path could be through a valve disc and seat, which is not pertinent to this AMP).	IPEC does not credit alternatives to direct visual examinations for fire mains. **No change is necessary.**
Detection of Aging Effects (Element 4) added: For multi-unit sites the inspections are distributed evenly among the units	As stated in NL-13-037, inspections are distributed between IP2 and IP3 according to material and code category. The numbers of inspection were not identical between the two units because of differences in plant design and in opportunities for inspections. **No change is necessary.**

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Detection of Aging Effects (Element 4 Table XI.M41-2) Significantly revised all preventive action categories and numbers of inspections. Changed the word "availability" to "operated" for cathodic protection Category C applicability.	The numbers of inspections performed in the IPEC program exceed the numbers recommended for plants in Category F, which has the highest numbers of recommended inspections. Cathodic protection is not credited to reduce the number of piping inspections at IPEC. Nevertheless, the IPEC program specifies cathodic protection system availability of 85% where availability is defined as percent of the time the rectifiers are in service providing cathodic protection. **No change is necessary.**
Detection of Aging Effects (Element 4 a.) added: Transitioning to a higher number of inspections	This item discusses transitioning to a category for which additional inspections are specified. Because cathodic protection is not credited, IPEC meets the criteria for preventive action Category F, which has the highest number of recommended inspections. The IPEC program provides for approximately twice as many inspections as recommended for Category F. **No change is necessary.**
Detection of Aging Effects (Element 4 b.i.) added: Where piping constructed of steel, copper alloy, or aluminum alloy has been coated with the same coating system and the backfill has the same requirements, the total inspections for this piping may be combined to satisfy the recommended inspection quantity.	Buried copper alloy piping was added to the IPEC program in 2013. This provision of the ISG allows the combination of copper alloy piping with steel piping to meet the recommended number of inspections. Since IPEC has carbon steel and copper alloy buried piping that are coated with the same material and have similar backfill, Sections A.2.1.5 and A.3.1.5 were revised to identify that carbon steel and copper alloy are combined into the same inspection population.

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Detection of Aging Effects (Element 4 b.iv.) added: If all of the in-scope polymeric material is nonsafety-related, no more than one inspection need be conducted.	This change reduces the required number of inspections for polymeric piping if it is nonsafety-related. There are no polymeric components in the scope of the IPEC Buried Piping and Tanks Inspection Program. **No change is necessary.**
Acceptance Criteria (Element 6 b.) added: Cracking is absent in rigid polymeric components. Blistering, gouges, or wear of nonmetallic piping is evaluated.	There are no polymeric components in the scope of the IPEC Buried Piping and Tanks Inspection Program. **No change is necessary.**
Acceptance Criteria (Element 6 c.) added: The measured wall thickness projected to the end of the period of extended operation meets minimum wall thickness requirements.	Section B.1.6 is revised to include projection of wall thickness to the end of the period of extended operation.
Acceptance Criteria (Element 6 d.) added: Indications of cracking in metallic pipe are managed in accordance with the "corrective actions" program element.	As noted above, the aging management review did not identify cracking as an aging effect requiring management for buried piping at IPEC. Nevertheless, Section B.1.6 includes the provision that adverse indications will be entered into the plant corrective action program for evaluation of extent of condition and for determination of appropriate corrective actions (e.g., increased inspection frequency, repair, replacement). Cracking of piping in the scope of the IPEC program is a condition that warrants entry into the corrective action program. **No change is necessary.**

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Acceptance Criteria (Element 6 f.) added: Backfill is acceptable if the inspections do not reveal evidence that the backfill caused damage to the component's coatings or the surface of the component (if not coated).	Corrective action for failure to meet the backfill acceptance criteria is moving to a higher inspection category. IPEC already performs numbers of inspections greater than specified for Category F, the category with the highest number of recommended inspections. **No change is necessary.**
Acceptance Criteria (Element 6 j.) added; When fire water system leak rate testing is conducted, leak rates are within acceptance limits of plant-specific documents.	Testing of fire protection systems as an alternative to inspections is not credited at IPEC. **No change is necessary.**
Acceptance Criteria (Element 6 m.) added: Alternatives to the -850 mV criterion for steel piping in Table XI.M41-3.	Program description states that IPEC will utilize the polarization potential of at least (i.e. more negative than) -850 mV instant-off as the acceptance criteria. No alternatives have been adopted. **No change is necessary.**
Corrective Actions (Element 7 b.) added: If coated or uncoated metallic piping or tanks show evidence of corrosion, the remaining wall thickness in the affected area is determined to ensure that the minimum wall thickness is maintained. This may include different values for large area minimum wall thickness and local area wall thickness. If the wall thickness extrapolated to the end of the period of extended operation meets minimum wall thickness requirements, recommendations for expansion of sample size, below do not apply.	The IPEC program includes provisions for supplementing visual inspections with surface or volumetric non-destructive testing if indications of significant loss of material are observed for underground piping. This provision is added to Sections A.2.1.5, A.3.1.5 and B.1.6 to address buried piping.

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Corrective Actions (Element 7 c.) added: Provisions to limit the expansion of sample size upon inspection results not meeting acceptance criteria. The number of inspections within the affected piping categories are doubled or increased by 5, whichever is smaller. This element also includes provisions to relax the timing recommendations for performance of the additional inspections.	The IPEC program includes provisions to double the sample size upon detection of significant coating damage as discussed in NL-13-098. In accordance with the ISG recommendations, the IPEC program will be revised to limit the number of inspections in the expanded sample to five (5). LRA Section B.1.6 is revised to add the sample expansion provisions from NL-13-098 with modifications consistent with LR-ISG-2015-01 regarding sample expansion and timing of inspections on the expanded sample.
Corrective Actions (Element 7 e.) added: Sources of leakage detected during pressure tests are identified and corrected.	ISG-2015-01 added an option of crediting an annual fire water system leakage test in lieu of performing inspections on the system piping. Testing of fire protection systems as an alternative to inspections is not credited at IPEC. **No change is necessary.**
Corrective Actions (Element 7 f.) added;: When using the option of monitoring the activity of a jockey pump instead of inspecting buried fire water system piping, a flow test or system leak rate test is conducted by the end of the next refueling outage or as directed by the current licensing basis, whichever is shorter, when unexplained changes in jockey pump activity (or equivalent equipment or parameter) are observed.	Testing of fire protection systems as an alternative to inspections is not credited at IPEC. **No change is necessary.**

LR-ISG-2015-01 Technical Change	Impact on Buried Piping and Tanks Inspection Program
Corrective Actions (Element 7 g.) added: Indications of cracking are evaluated in accordance with applicable codes and plant-specific design criteria.	As noted above, the aging management review did not identify cracking as an aging effect requiring management. Therefore, this corrective action is not applicable at IPEC. Nevertheless, LRA Section B.1.6 includes the provision that adverse indications will be entered into the plant corrective action program for evaluation of extent of condition and for determination of appropriate corrective actions (e.g., increased inspection frequency, repair, replacement). **No change is necessary.**

ATTACHMENT 2 TO NL-17-048

Changes to the License Renewal Application

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3
DOCKET NOS. 50-247 AND 50-286

A.2.1.5 Buried Piping and Tanks Inspection Program

The Buried Piping and Tanks Inspection Program is a new program that includes (a) preventive measures to mitigate corrosion and (b) inspections to manage the effects of corrosion on the pressure-retaining capability of buried and underground carbon steel, copper alloy, gray cast iron, and stainless steel components. The program manages loss of material for bolting on piping within the scope of the program. Preventive measures are in accordance with standard industry practice for maintaining external coatings and wrappings. Buried components are inspected when excavated during maintenance. If trending within the corrective action program identifies susceptible locations, the areas with a history of corrosion problems are evaluated for the need for additional inspection, alternate coating, or replacement. Cathodic protection (CP) systems installed at IPEC provide additional protection of license renewal in-scope buried piping and minimize corrosion in areas that have been found susceptible to corrosion based on indirect inspections or testing. To the extent they are proven effective, the CP systems at IPEC will be considered in risk ranking to ensure that the in-scope buried piping systems that are more susceptible to external corrosion continue to receive a higher risk ranking when determining inspection priority. IPEC will perform CP surveys at least once every twelve (12) months.

IP2 will perform 20 direct visual inspections of buried piping during the 10 year period prior to the PEO. IP2 will perform 14 direct visual inspections of carbon steel/copper alloy buried piping during each 10-year period of the PEO. Soil samples will be taken prior to the PEO and at least once every 10 years in the PEO. Soil will be tested at a minimum of two locations at least three feet below the surface near in-scope piping to determine representative soil conditions for each system. If test results indicate the soil is corrosive then the number of carbon steel/copper alloy piping inspections will be increased to 20 during each 10-year period of the PEO. Visual inspections will be supplemented with surface or volumetric non-destructive testing if indications of significant loss of material are observed. Measured wall thickness will be projected to the end of the period of extended operation to ensure minimum wall thickness requirements are met.

The Buried Piping and Tanks Inspection Program will be implemented prior to the period of extended operation. This new program will be implemented consistent with the corresponding program described in NUREG-1801 Section XI.M34, Buried Piping and Tanks Inspection with the following modification.

The Buried Piping and Tanks Inspection Program will be modified based on operating experience to include a risk assessment of in-scope buried piping and tanks that includes consideration of the impacts of buried piping or tank leakage and of conditions affecting the risk for corrosion. The program will classify pipe segments and tanks as having a high, medium or low impact of leakage based on the safety class, the hazard posed by fluid contained in the piping and the impact of leakage on reliable plant operation. Corrosion risk will be determined through consideration of piping or tank material, soil resistivity, drainage, the presence of cathodic protection and the type of coating. Inspection priority and frequency for periodic inspections of the in-scope piping and tanks will be based on the results of the risk assessment. Inspections will be performed using qualified inspection techniques with demonstrated effectiveness, Inspections will begin prior to the period of extended operation.

Underground piping within the scope of license renewal and subject to aging management review will be visually inspected prior to the period of extended operation and then on a

frequency of at least once every two years during the period of extended operation. This inspection frequency will be maintained unless the piping is subsequently coated in accordance with the preventive actions specified in NUREG-1801 Section XI.M41 as modified by LR-ISG-~~2011-03~~2015-01. Visual inspections will be supplemented with surface or volumetric non-destructive testing if indications of significant loss of material are observed. Measured wall thickness will be projected to the end of the period of extended operation to ensure minimum wall thickness requirements are met. Consistent with revised NUREG-1801 Section XI.M41, such adverse indications will be entered into the plant corrective action program for evaluation of extent of condition and for determination of appropriate corrective actions (e.g., increased inspection frequency, repair, replacement).

A.3.1.5 Buried Piping and Tanks Inspection Program

The Buried Piping and Tanks Inspection Program is a new program that includes (a) preventive measures to mitigate corrosion and (b) inspections to manage the effects of corrosion on the pressure-retaining capability of buried and underground carbon steel, gray cast iron, copper alloy and stainless steel components. The program manages loss of material for bolting on piping within the scope of the program. Preventive measures are in accordance with standard industry practice for maintaining external coatings and wrappings. Buried components are inspected when excavated during maintenance. If trending within the corrective action program identifies susceptible locations, the areas with a history of corrosion problems are evaluated for the need for additional inspection, alternate coating, or replacement. Cathodic protection (CP) systems installed at IPEC provide additional protection of license renewal in-scope buried piping and minimize corrosion in areas that have been found susceptible to corrosion based on indirect inspections or testing. To the extent they are proven effective, the CP systems at IPEC will be considered in risk ranking to ensure that the in-scope buried piping systems that are more susceptible to external corrosion continue to receive a higher risk ranking when determining inspection priority. IPEC will perform CP surveys at least once every twelve (12) months.

IP3 will perform 14 direct visual inspections of buried piping during the 10 year period prior the PEO. IP3 will perform 16 direct visual inspections of carbon steel/copper alloy and stainless steel buried piping during each 10-year period of the PEO. Soil samples will be taken prior to the PEO and at least once every 10 years into the PEO. Soil will be tested at a minimum of two locations at least three feet below the surface near in-scope piping to determine representative soil conditions for each system. If test results indicate the soil is corrosive then the number of carbon steel/copper alloy piping inspections will be increased to 22 during each 10-year period of the PEO. Visual inspections will be supplemented with surface or volumetric non-destructive testing if indications of significant loss of material are observed. Measured wall thickness will be projected to the end of the period of extended operation to ensure minimum wall thickness requirements are met.

The Buried Piping and Tanks Inspection Program will be implemented prior to the period of extended operation. This new program will be implemented consistent with the corresponding program described in NUREG-1801 Section XI.M34, Buried Piping and Tanks Inspection with the following modification.

The Buried Piping and Tanks Inspection Program will be modified based on operating experience to include a risk assessment of in-scope buried piping and tanks that includes consideration of the impacts of buried piping or tank leakage and of conditions affecting the risk

for corrosion. The program will classify pipe segments and tanks as having a high, medium or low impact of leakage based on the safety class, the hazard posed by fluid contained in the piping and the impact of leakage on reliable plant operation. Corrosion risk will be determined through consideration of piping or tank material, soil resistivity, drainage, the presence of cathodic protection and the type of coating. Inspection priority and frequency for periodic inspections of the in-scope piping and tanks will be based on the results of the risk assessment. Inspections will be performed using qualified inspection techniques with demonstrated effectiveness, Inspections will begin prior to the period of extended operation. Underground piping within the scope of license renewal and subject to aging management review will be visually inspected prior to the period of extended operation and then on a frequency of at least once every two years during the period of extended operation. This inspection frequency will be maintained unless the piping is subsequently coated in accordance with the preventive actions specified in NUREG-1801 Section XI.M41 as modified by LR-ISG-2011-03. Visual inspections will be supplemented with surface or volumetric non-destructive testing if indications of significant loss of material are observed. Measured wall thickness will be projected to the end of the period of extended operation to ensure minimum wall thickness requirements are met. Consistent with revised NUREG-1801 Section XI.M41, such adverse indications will be entered into the plant corrective action program for evaluation of extent of condition and for determination of appropriate corrective actions (e.g., increased inspection frequency, repair, replacement).

B.1.6 BURIED PIPING AND TANKS INSPECTION

Program Description

The Buried Piping and Tanks Inspection Program is a new program that includes (a) preventive measures to mitigate corrosion and (b) inspections to manage the effects of corrosion on the pressure-retaining capability of buried and underground carbon steel, gray cast iron, copper alloy and stainless steel components. The program manages loss of material for bolting on piping within the scope of the program. Preventive measures are in accordance with standard industry practice for maintaining external coatings and wrappings. Buried components are inspected when excavated during maintenance. If trending within the corrective action program identifies susceptible locations, the areas with a history of corrosion problems are evaluated for the need for additional inspection, alternate coating, or replacement. The program applies to buried components in the following systems.

- Safety injection
- Service water
- Fire protection
- Fuel oil
- Security generator
- City water
- Plant drains
- Auxiliary feedwater
- Containment isolation support
- River water service (IP1)
- Circulating water system (IP2)
- Instrument air (IP2)

Of these systems, only the safety injection system contains radioactive fluids during normal operations. The safety injection system buried components are stainless steel. Stainless steel is used in the safety injection system for its corrosion resistance. This program also applies to underground components in the IP3 service water and city water systems and the IP2 and IP3 fuel oil systems.

Cathodic protection systems installed at IPEC provide additional protection of license renewal in-scope buried piping and minimize corrosion in areas that have been found susceptible to corrosion based on indirect inspections (i.e., guided wave inspections) or testing (e.g., AP-EC surveys). To the extent they are proven effective, the CP systems at IPEC will be considered in risk ranking to ensure that the in-scope buried piping systems more susceptible to external corrosion continue to receive a higher risk ranking when determining inspection priority.

The CP systems will be monitored with the following acceptance criteria.

- Minimum -850 mV instant-off soil-to-pipe potential relative to a copper/copper sulfate reference electrode

- Maximum -1200 mV instant-off soil-to-pipe potential relative to a copper/copper sulfate reference electrode

- Minimum availability of 85%. The percent of system availability is calculated by determining the percent of the time the rectifiers are in service providing cathodic protection. "In service" is defined as rectifier current output values greater than zero amps or zero volts. The time the system is out of service for testing is not included in the calculation of system availability.

- Minimum of 80% CP system effectiveness. Test locations must meet a soil-to-pipe potential of instant-off -850 mV to -1200 mV relative to a copper/copper sulfate reference electrode. The percent of CP effectiveness is calculated by using the last measured values at each test station and dividing the total number of CP survey points that meet the required acceptance criteria by the total number of points surveyed during the monitoring period.

Failure to meet these acceptance criteria will result in no credit being taken for the CP system in the risk ranking process. IPEC will perform CP surveys at least once every twelve (12) months.

The Buried Piping and Tanks Inspection Program will be modified based on operating experience to include a risk assessment of in-scope buried piping and tanks that includes consideration of the impacts of buried piping tank or tank leakage and of conditions affecting the risk for corrosion. The program will classify pipe segments and tanks as having a high, medium or low impact of leakage based on the safety class, the hazard posed by fluid contained in the piping and the impact of leakage on reliable plant operation. Corrosion risk will be determined through consideration of piping or tank material, soil resistivity, drainage, the presence of cathodic protection and the type of coating. Inspection priority and frequency for periodic inspections of the in-scope piping and tanks will be based on the results of the risk assessment. Inspections will be performed using qualified inspection techniques with demonstrated effectiveness. Visual inspections will be supplemented with surface or volumetric non-destructive testing if indications of significant loss of material are observed. Measured wall thickness will be projected to the end of the period of extended operation to ensure minimum wall thickness requirements are met. Inspections will begin prior to the period of extended operation.

If future inspections reveal significant coating damage caused by non-conforming backfill, then Entergy will double the inspection sample size up to an increase of five (5) inspections. If adverse indications are found in the expanded inspection sample, then Entergy will determine the extent of condition and the extent of cause. The size of the follow-up inspection sample will be determined based on the extent of condition and the extent of cause. The timing of the additional examinations will be based on the severity of the degradation and will be commensurate with the consequences of a leak or loss of function from the affected pipe. In all cases, the expanded sample inspections will be completed within the 10-year interval in which the original adverse indication was identified or, if identified in the latter half of the 10-year interval, within 4 years after the end of the 10-year interval. Sample size expansion may be limited by the extent of piping or tanks subject to the observed degradation mechanism.

Underground piping within the scope of license renewal and subject to aging management review will be visually inspected prior to the period of extended operation and then on a frequency of at least once every two years during the period of extended operation. This inspection frequency will be maintained unless the piping is subsequently coated in accordance with the preventive actions specified in NUREG-1801 Section XI.M41 as modified by LR-ISG-

~~2011-03~~2015-01. Visual inspections will be supplemented with surface or volumetric non-destructive testing if indications of significant loss of material are observed. Measured wall thickness will be projected to the end of the period of extended operation to ensure minimum wall thickness requirements are met. Consistent with revised NUREG-1801 Section XI.M41, such adverse indications will be entered into the plant corrective action program for evaluation of extent of condition and for determination of appropriate corrective actions (e.g., increased inspection frequency, repair, replacement).

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

NUREG-1801 Consistency

The Buried Piping and Tanks Inspection Program will be consistent with program attributes described in NUREG-1801, Section XI.M34, Buried Piping and Tanks Inspection.

Exceptions to NUREG-1801

None

Enhancements

None

Operating Experience

The Buried Piping and Tanks Inspection Program is a new program. Plant and industry operating experience will be considered when implementing this program. Industry operating experience that forms the basis for the program is described in the operating experience element of the NUREG-1801 program description. IPEC plant-specific operating experience is not inconsistent with the operating experience in the NUREG-1801 program description.

The IPEC program is based on the program description in NUREG-1801, which in turn is based on industry operating experience. As such, operating experience assures that implementation of the Buried Piping and Tanks Inspection program will manage the effects of aging such that applicable components will continue to perform their intended functions consistent with the current licensing basis through the period of extended operation.

Conclusion

The Buried Piping and Tanks Inspection Program will be effective for managing aging effects since it will incorporate proven monitoring techniques, acceptance criteria, corrective actions, and administrative controls. The Buried Piping and Tanks Inspection Program assures 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.