NEXTera® ENERGY SEABROOK

October 7, 2016

10 CFR 54

SBK-L-16156
Docket No. 50-443

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

Seabrook Station
Response to Issuance of LR-ISG-2015-01
Changes to Buried and Underground Piping and Tank Recommendations

References:

1. NextEra Energy Seabrook LLC, letter SBK-L-10077, "Seabrook Station Application for Renewed Operating License," May 25, 2010.
2. License Renewal Interim Staff Guidance, LR-ISG-2015-01 – Changes to Buried and Underground Piping and Tank Recommendations.
3. NextEra Energy Seabrook, LLC letter SBK-L-13115, "Third Annual Update to the NextEra Energy Seabrook License Renewal Application," July 2, 2013.

In Reference 1, NextEra Energy Seabrook submitted an application for a renewed facility operating license for Seabrook Station Unit 1 in accordance with the Code of Federal Regulations, Title 10, Parts 50, 51, and 54.

In Reference 2, the NRC issued License Renewal Interim Staff Guidance, LR-ISG-2015-01 – Changes to Buried and Underground Piping and Tank Recommendations. The guidance provided within this ISG was utilized to develop the NextEra Energy Seabrook's Buried Piping and Tanks Inspection Aging Management Program.

In Reference 3, NextEra Energy provided the Staff with letter SBK-L-13115, "Third Annual Update to the NextEra Energy Seabrook License Renewal Application" which incorporated the guidance within License Renewal Interim Staff Guidance, LR-ISG-2011-03 – Changes to the Generic Aging Lessons Learned (GALL) Report Revision 2 Aging Management Program XI.M41, "Buried and Underground Piping and Tanks."

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Enclosure 1 provides NextEra Energy Seabrook's revised License Renewal Application, Appendix A – Updated Final Safety Analysis Report Supplement, A.2.1.22 Buried Piping and Tanks Inspection.

Enclosure 2 provides NextEra Energy Seabrook's revised License Renwal Application, Appendix B – Aging Management Programs, B.2.1.22 Buried Piping and Tanks Inspection.

The changes are explained, and where appropriate to facilitate understanding, portions of the LRA are repeated with the change highlighted by strikethroughs for deleted text and bolded italics for inserted text. In some instances the entire text of a section has been replaced or added. In these cases a note is included in the introduction indicating the replacement of the entire text of the section.

There are no new or revised regulatory commitments contained in this letter.

If there are any questions or additional information is needed, please contact Mr. Edward J. Carley, Engineering Supervisor - License Renewal, at (603) 773-7957.

If you have any questions regarding this correspondence, please contact Mr. Kenneth Browne, Licensing Manager, at (603) 773-7932.

I declare under penalty of perjury that the foregoing is true and correct.
Executed on October 7, 2016.

Sincerely,
NextEra Energy Seabrook, LLC

Eric McCartney
Site Vice President

Enclosures:

Enclosure 1 - NextEra Energy Seabrook's revised License Renewal Application, Appendix A – Updated Final Safety Analysis Report Supplement, A.2.1.22 Buried Piping and Tanks Inspection.

Enclosure 2 - NextEra Energy Seabrook's revised License Renewal Application, Appendix B – Aging Management Programs for B.2.1.22 Buried Piping and Tanks Inspection.

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Enclosure 1 to SBK-L-16156

NextEra Energy Seabrook's revised License Renewal Application, Appendix A – Updated Final Safety Analysis Report Supplement, A.2.1.22 Buried Piping and Tanks Inspection.

Changes to A.2.1.1 were editorial in nature to align with the changes reflected within LR-ISG-2015-01 as well as the previous NextEra Energy Seabrook Buried Piping and Tanks Inspection Aging Management Plan.

A.2.1.1 BURIED PIPING AND TANKS INSPECTION

The Buried Piping and Tanks Inspection Program manages loss of material from the external surfaces of buried, underground, and inaccessible submerged steel, stainless steel, ***Copper Alloy (>15% Zinc),*** and polymer piping and components. The plant has no buried tanks in scope for license renewal. Depending on the material, the program includes external coatings, cathodic protection, analyses for soil corrosivity, and quality of backfill as preventive measures to mitigate corrosion.

The program includes provisions for visual inspections of the protective wraps and coatings on buried steel and stainless steel piping. If damage to the protective wraps or coatings is found and the piping surface is exposed, the pipe is inspected for loss of material due to general, pitting, crevice or microbiologically-influenced corrosion. If corrosion has occurred, the wall thickness will be determined. Stainless steel piping will be inspected for stress corrosion cracking using volumetric non-destructive examination techniques. Polymer piping is inspected for changes in material properties.~~ and for indication of cracking and blistering~~.

The program includes verification of the effectiveness of the cathodic protection system, non-destructive evaluation of the pipe wall thicknesses, ~~hydrostatic~~ ***pressure*** testing of the pipe, internal inspections, and monitoring of the fire protection system jockey pump operation.

This program also manages the aging effects (loss of material and loss of preload) of buried, underground, or inaccessible submerged piping system bolting.

Enclosure 2 to SBK-L-16156

NextEra Energy Seabrook's revised License Renewal Application, Appendix B – Aging Management Programs for B.2.1.22 Buried Piping and Tanks Inspection.

License Renewal Interim Staff Guidance (LR-ISG) LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," provides changes to NUREG-1801, "Generic Aging Lessons Learned (GALL) Report," Revision 2 (December 2010), and NUREG-1800, "Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants," (SRP-LR), Revision 2 (December 2010). LR-ISG-2015-01 replaces 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'." Seabrook has evaluated LR-ISG-2015-01 and revised the Buried Piping and Tanks Inspection Program to incorporate the guidance within the ISG,

NOTE: Due to significant changes within the body of B.2.1.22, the following text will directly replace the previous version of B.2.1.22.

B.2.1.22 BURIED PIPING AND TANKS INSPECTION

Program Description

The Seabrook Station Buried Piping and Tanks Inspection Program is a new plant specific program. Although the program title refers to buried tanks as well as piping, Seabrook Station has no buried tanks in scope for license renewal.

The Seabrook Station program will include coatings, cathodic protection, and backfill quality as preventive measures to mitigate corrosion and periodic inspections that manage the aging effects of corrosion on buried, underground, and inaccessible submerged piping in the scope for license renewal. Soil analyses will be performed to determine corrosivity of the soil near non-cathodically protected steel pipe. The corrosivity of the soil will be used as a factor in determining the number of locations or percentage of piping to be inspected for non-cathodically protected steel piping.

At Seabrook Station the initial installation of in-scope buried steel and stainless steel piping included external coatings and wrappings. Coatings and wrappings are repaired or replaced when damage is detected.

Visual inspections for damage will be performed when in-scope piping is excavated during maintenance and whenever they become accessible for any reason. The inspections will look for evidence of damaged wrapping or coating defects, such as coating perforation, holidays, or other damage. If damage or degradation of coating materials is found, and the piping surface is exposed, the affected area will be inspected visually to detect loss of material by external corrosion (including microbiologically-induced corrosion, MIC), and by surface or volumetric non-destructive examination

techniques to detect cracking due to stress corrosion cracking in stainless steel piping or loss of pipe wall thickness in stainless steel or steel piping.

The Seabrook Station program will also include provisions for visual inspections of buried polymeric piping in-scope for license renewal. These inspections for damage will be performed when the piping is excavated during maintenance and when a pipe becomes accessible for any other reason. These inspections will include mechanical examination for evidence of changes in material properties.

At least one opportunistic or directed inspections will be performed for each piping material within the scope of this program within the 10 years prior to entering the period of extended operation and during the period of extended operation. Upon entering the period of extended operation at least one directed inspection will be performed for each piping material within the scope of this program each ten years. Opportunistic inspections may be credited provided all location selection criteria are met.

Pressure testing may be performed in lieu of external visual inspections provided that at least 25% of the piping constructed from the material under consideration is pressure tested to 110 percent of the design pressure of any component within the boundary with test pressure being held for eight hours on an interval not to exceed 5 years.

Internal inspection may also be performed in lieu of external visual inspections discussed above provided that at least 25% of the piping constructed from the material under consideration is internally inspected by a method capable of determining pipe wall thickness. The inspection method must be capable of detecting both general and pitting corrosion and must be qualified by Seabrook Station and accepted by the NRC. Internal inspections are to be conducted at an interval not to exceed 10 years.

Fire mains may also be excluded from external visual inspections if (a) subjected to a flow test as described in section 7.3 of NFPA 25 “Standard for the Installation of Private Fire Service Mains and Their Appurtenances”, at a frequency of at least one test in each one year period; (b) the jockey pump (e.g., pump starts, run time) is monitored for unexplained changes in pump activity at an interval not to exceed one month; (c) subjected to an annual system leak rate test.

Within this program, the following three different environments are referenced:

1. *Buried Piping*: This term means the piping is in direct contact with soil or concrete.

2. *Underground Piping*: This term means the piping is located below grade but contained within a vault such that it is in contact with air and located where access for inspection is restricted.

3. *Inaccessible Submerged Piping*: This term means the piping is located below grade but contained within a vault such that it is in contact with ground water (raw water) and located where access for inspection is restricted.

   Portions of the Service Water system piping are routed through underground vaults or valve pits, which were installed to provide access to the buried Service Water piping for internal inspections. These vaults and pits were not designed to be watertight and subsequently the piping is typically submerged in ground water. This environment is different from "underground" since the normal external environment is ground water and not air. Therefore, for the purpose of this program, the affected Service Water piping segments are referred to as "inaccessible submerged" piping. This piping is coated and cathodically protected. With the exception of backfill and soil resistivity criteria, this piping will be inspected to the same extent as buried piping.

This Buried Piping and Tanks Inspection Program also provides for management of loss of material due to corrosion and to detect leakage caused by loss of pre-load on buried, underground, and inaccessible submerged piping system bolting.

Program Elements

ELEMENT 1 - Scope of Program

This program is used to manage the effects of aging for buried, underground, and inaccessible submerged piping within the scope of license renewal. The program addresses aging effects such as loss of material, cracking, and changes in material properties.

The Seabrook Station Buried Piping and Tanks Inspection Program includes (a) preventive measures to mitigate corrosion and (b) inspections

to manage aging effects on in-scope piping. This program requires opportunistic or directed inspection of each piping material within the scope of this program be performed within ten years prior to entering the period of extended operation. Periodic inspections are performed every 10 years after entering the period of extended operation.

Loss of material due to corrosion of buried, underground, and inaccessible submerged piping system bolting within the scope of license renewal is managed using this program. This program will also manage loss of preload in pressure retaining bolting within the scope of this program by visual inspection for evidence of leakage when the associated piping is inspected by this program.

The program is required to support the aging management activities for buried steel, stainless steel, polymeric piping, and inaccessible submerged steel piping. The following systems are within the scope of license renewal, and have components that are age managed by this program;

- AB Auxiliary Boiler
- ASC Auxiliary Steam Condensate
- ASH Auxiliary Steam Heating
- CBA Control Building Air Handling
- CO Condensate
- DF Plant Floor Drain
- DG Diesel Generator
- IA Instrument Air
- FW Feedwater
- FP Fire Protection
- SW Service Water

Implementation of the final design change replacing the piping associated with the above-ground fuel oil storage tank will be completed prior to the period of extended operation. The design for buried portions of the system will include a pipe-within-pipe configuration with leak detection capability. Portions of that buried piping that are in-scope for license renewal will be included in the Seabrook Station Buried Piping and Tanks Inspection Program. Portions of that final design that are above-ground, including tanks, will be evaluated in accordance with the License Renewal Rule, 10 CFR 54, and age managed under the appropriate programs through the period of extended operation

ELEMENT 2 - Preventive Actions

Preventive actions utilized by this program vary with the material of the tank or pipe and the environment (e.g. air, soil, concrete) to which it is exposed. Table 1 below provides recommended Preventive Actions.

Table 1 - Preventive Actions for Buried and Underground Piping and Tanks **C: Coatings; CP: Cathodic Protection; B: Backfill**		
Material	Buried	Underground
Stainless Steel	C,B	None
Steel	C, CP, B	C
Copper Alloy	C, CP, B	C
Aluminum Alloy	C, CP, B	None
Cementitious	C, CP, B	None
Polymer	B	None

Coating

In-scope buried steel and stainless steel pipes were wrapped and / or coated per original construction requirements to protect the outer surface from coming in contact with a soil environment. The in-scope buried steel and stainless steel have external coatings and wrappings in accordance with Specification For Shop Fabrication Of Cement Lined Pipe And Non-Ferrous Pipe Spec. No. 248-2. This external coating was fabricated and applied in accordance with the requirements of American Water Works Association (AWWA) Specification C203. The specification calls for all coated surfaces to be tested. All coated surfaces were tested and any holidays, faults, or missed places indicated by the holiday detector were repaired utilizing the same system as the original coating per AWWA C203. The AWWA C203 meets the requirements of NACE SP0169-2007, "Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems," Table 1.

The in-scope buried steel and stainless steel piping are maintained in accordance with Seabrook Station maintenance procedures.

In-scope polymeric piping is not wrapped or coated.

Backfill Quality

Seabrook Station Specifications provide the requirements for backfill material sizing shown below. Also shown are material sizing specified by ASTM D-488 for sizes number 67 and 10 for comparison.

Sieve Size	Percent Passing		
	Seabrook Backfill Specification	ASTM D 448-08	
		Size 67 ¾" to #4	Size 10 #4 to 0
1½"	100	--	--
1"	---	100	--
¾"	100-95	100-90	--
⅜"	--	55-20	100
#4	95-50	10-0	100-85
#8	---	5-0	--
#10	86-30	--	--
#20	70-15	--	--
#40	50-7	--	---
#60	32-3	--	--
#100	--	--	30-10
#200 (washed)	10-0.2	--	--

Backfill quality will be evaluated during all excavations and determined to be acceptable if the inspections conducted by this program do not reveal evidence of mechanical damage to pipe or pipe coatings due to the backfill.

Cathodic Protection

The Seabrook Station buried Service Water, Diesel Generator cooling water, and Instrument Air piping within the scope of license renewal are cathodically protected. Additionally, portions of other buried piping within the scope of license renewal in the Fire Protection and Control Building Air Handling systems are also cathodically protected.

Underground piping cathodic protection system data acquisition/surveillance is performed on a frequency of no later than one year to determine the effectiveness of the cathodic protection system. The cathodic protection system meets the NACE recommendations for pipe to pipe potential as defined by NACE SP0169-2007, "Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems."

Soil Sampling

Seabrook Station has performed soil sampling and analyses to determine the corrosivity of the soil and pipe-to-soil potential. Fourteen locations were sampled throughout the site.

In addition to laboratory analysis of collected soil samples, in-situ measurements of electrical potential and soil resistivity were performed by an experienced geophysicist. Soil potential measurements were performed within each soil boring following collection of soil samples. Soil resistivity measurements were conducted within the general proximity of each boring location.

AWWA standard C105 was used to determine a corrosivity index at each location. A corrosivity index of 10 points or greater is classified as corrosive soil conditions. With one exception, all locations received a corrosivity point total of 5 or less, had a soil resistivity ranging from 2,297 to 242,867 ohm-cm, and were noted to be in areas of medium to fine sand with some gravel. Field moisture observations ranged from dry (1 location) to moist (7 locations) to saturated (6 locations).

The single exception was a location selected to inspect a section of 24" cement lined carbon steel pipe in the circulating water system. In the fall of 2012, this location received a corrosivity point total of 3. In the spring of 2013, it received 14 points primarily due to a decrease in resistivity from >3000 ohm-cm to less than 1500 ohm-cm. The texture of the soil in that area was described as medium to fine sand, some silt and clay. The only LR in-scope piping in the vicinity of this sample location is Fire Protection piping, which is inspected using the jockey pump operation.

ELEMENT 3 - Parameters Monitored or Inspected

Steel and stainless steel piping will be inspected for degradation of coating materials. Should damage or other degradation of coating materials so as to expose the base material be noted, the condition will be documented, evaluated, and corrected in accordance with the Seabrook Station corrective action program. When such damage or degradation of coating materials is found, the affected area will be visually inspected to detect loss of material by external corrosion, and by surface or volumetric non-destructive examination techniques to detect cracking due to stress corrosion cracking in stainless steel piping or loss of pipe wall thickness in stainless steel and steel piping.

Polymer piping will be inspected, by manual examinations, for changes in material properties, and by visual inspection for signs of cracking, blistering or damage. Any changes in material properties, or signs of cracking, blistering or damage, will be documented, evaluated, and, corrected in accordance with the Seabrook Station corrective action program.

Visual inspections of: (a) the external surface condition of buried or underground piping; (b) the external surface condition of associated coatings; or (c) external surfaces of controlled low strength material backfill are performed. Monitoring of the surface condition of the component is conducted to ensure that the aging effects are not present or have not progressed to such a degree where a loss of intended function could occur. Monitoring of the surface condition of coatings is conducted to ensure that the coatings are intact, well-adhered, and otherwise

sound; such that aging effects would not be expected for the base material of the component. Monitoring of the external surfaces of controlled low strength material backfill is conducted to ensure that there are no cracks present that could admit groundwater to the surface of the component.

Visual inspections of the external surface condition of the component should detect:

- 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.

- Loss of material due to wear for polymeric materials.

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.

Inspections for cracking due to stress corrosion cracking for steel, stainless steel and susceptible aluminum alloy materials will 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; and (b) exhibit small blisters that are few in number and completely surrounded by sound coating bonded to the substrate do not have to be removed. Inspections for cracking are conducted to assess the impact of cracks on the pressure boundary function of the component.

Two additional parameters, the pipe to soil potential and the cathodic protection current, will be monitored to determine the effectiveness of cathodic protection systems and, thereby, the effectiveness of corrosion mitigation.

This program provides an alternate means to test the integrity of the buried piping systems at Seabrook Station in lieu of external visual inspections. These alternate means are pressure testing, internal inspection, as well as flow testing, jockey pump monitoring, or annual system leakage rate testing of fire mains. These inspection and testing techniques have been demonstrated to provide reliable indication of the piping integrity, are preferable to excavation and visual inspection.

To credit pressure testing in lieu of visual inspection, at least 25% of the piping constructed from the material under consideration must be pressure tested to

110 percent of the design pressure of any component within the boundary with test pressure being held for eight hours and on an interval not to exceed 5 years. Such testing will identify boundary leakage in significantly larger portions of the respective piping system than excavation and visual inspection of coating integrity.

To credit internal inspection, at least 25% of the piping constructed from the material under consideration is internally inspected by a method capable of determining pipe wall thickness. The inspection method must be capable of detecting both general and pitting corrosion and must be qualified by Seabrook Station and accepted by the NRC. Internal inspections are to be conducted at an interval not to exceed 10 years.

Fire mains may be excluded from the visual inspections if subjected to a flow test as described in section 7.3 of NFPA 25, at a frequency of at least one test in each one year period, or the jockey pump operation (e.g., pump starts, run time) is monitored for unexplained changes in pump activity at an interval not to exceed once a month.

At Seabrook Station, the fire protection jockey pump maintains the fire mains pressurized. Starts and running time of the fire protection jockey pumps are monitored and treated as an indicator of possible system leakage. This method of continuous monitoring of pressure losses in the fire mains will identify pipe boundary leakage in significantly larger portions of the fire protection piping system than excavation and visual inspection of coating integrity. At a minimum, a flow test will be conducted by the end of the next refueling outage or as directed by current licensing basis, whichever is shorter, when unexplained changes in jockey pump activity (or equivalent parameter) are observed.

This program also provides for management of the aging effects (loss of material) on buried, underground, and inaccessible submerged piping system bolting. Bolted connections in buried, underground, and inaccessible submerged piping will be inspected for indication of leakage caused by loss of preload when the associated piping is inspected by this program. In instances where pressure testing, flow testing, or fire protection jockey pump monitoring are used in lieu of visual inspections, these methods will also be credited to identify leakage caused by loss of preload at bolted connections.

ELEMENT 4 - Detection of Aging Effects

The Seabrook Station Buried Piping and Tanks Program consists of inspection activities that are designed to detect degradation due to aging effects prior to loss of intended function. For buried and underground steel and stainless steel piping, opportunistic or directed visual inspections will be performed to confirm that coating and wrapping are intact. In the event that the coating has been compromised and bare metal exposed, metallic piping is inspected for loss of

material due to all forms of corrosion and, for stainless steel, cracking due to stress corrosion cracking. Wall thickness is determined by a non-destructive examination technique such as ultrasonic testing (UT). For buried polymer piping, opportunistic or directed visual inspections are augmented with manual examinations to detect hardening, softening, or other changes in material properties.

Pipe to soil potential and the cathodic protection current are monitored for steel piping in contact with soil to determine the effectiveness of cathodic protection systems and, thereby, the effectiveness of corrosion mitigation.

The program requires that opportunistic or directed inspections will be performed within 10 years prior to entering the period of extended operation. Upon entering the period of extended operation, directed inspections will be performed during each subsequent ten year period. Opportunistic and/or directed visual inspections will be performed in areas with the highest likelihood of corrosion problems, or areas with a history of corrosion problems. Opportunistic inspections may be credited provided all location selection criteria are met.

Opportunistic Inspections

All in-scope buried and underground piping, regardless of the material of construction, is inspected by visual means whenever becoming accessible for any reason. Opportunistic examinations may be credited toward directed examinations if the location selection criteria are met.

Directed Inspections – Buried and Underground Pipe

Extent of inspection for each 10 year interval is based upon material and Preventive Action Category designation as shown in the below tables.

Soil samples will be taken prior to entering the period of extended operation (PEO) to confirm that the soil conditions are not corrosive. The corrosivity of the soil will be used as a factor in determining the number of locations or percentage of piping to be inspected for non-cathodically protected steel piping. If the initial survey shows the soil to be non-corrosive, additional soil samples will be taken at least once every 10 years during the PEO to confirm the initial sample results. Soil samples will be taken at a minimum of two locations in the vicinity of in-scope, non-cathodically protected steel piping to obtain representative soil conditions for each system (except for Fire Protection if the integrity of that system is monitored by jockey pump performance). The parameters monitored will be utilized to obtain a comparative corrosion index (corrosivity) for the piping within the systems monitored. Corrosivity will be determined using established soil analysis methodology such as EPRI Report 1021470, "Balance of Plant Corrosion - The Buried Pipe Reference Guide", Chapter 8, "Soil Analysis." The EPRI report arrives at a corrosion index using combined values for soil resistivity, pH, redox potential, sulfides, and moisture in accordance with American Water

Works Association standard C105, and considers the soil to be corrosive if the combined value of 10 or greater

Seabrook Station has already performed soil sampling and analyses to determine the corrosivity of the soil and pipe-to-soil potential. Fourteen locations were sampled throughout the site.

In addition to laboratory analysis of collected soil samples, in-situ measurements of electrical potential and soil resistivity were performed by an experienced geophysicist. Soil potential measurements were performed within each soil boring following collection of soil samples. Soil resistivity measurements were conducted within the general proximity of each boring location.

AWWA standard C105 was used to determine a corrosivity index at each location. A corrosivity index of 10 points or greater is classified as corrosive soil conditions. With one exception, all locations received a corrosivity point total of 5 or less, had a soil resistivity ranging from 2,297 to 242,867 ohm-cm, and were noted to be in areas of fine, medium, or course sand with some gravel. Field moisture observations ranged from dry (1 location) to moist (7 locations) to saturated (6 locations).

The single exception was a location selected to inspect a section of 24" cement lined carbon steel pipe in the circulating water system. In the fall of 2012, this location received a corrosivity point total of 3. In the spring of 2013, it received 14 points primarily due to a decrease in resistivity from >3000 ohm-cm to less than 1500 ohm-cm. The texture of the soil in that area was described as medium to fine sand, some silt and clay. The only LR in-scope piping in the vicinity of this sample location is Fire Protection piping, which is inspected using the jockey pump operation.

Seabrook Station has performed site excavations in support of the NEI 09-14 Buried Piping Inspection Initiative which included locations representative of systems and pipe materials that are in-scope for license renewal. These excavations and subsequent removal of the protective coating, and visual examination and ultrasonic testing of the exterior pipe wall in general showed no indications of coating damage or pipe wall corrosion or external wall loss. The only exceptions were a stainless steel line, coated during installation, which had several areas where the coating had peeled back and had areas of exposed pipe, and a not in-scope service air line which showed some pitting corrosion following removal of the coating. Where feasible, each direct examination included at minimum of a ten foot length of pipe.

Alternatives to visual examination of piping are as follows:

(A) Pressure testing may be performed in lieu of the inspections described below. To credit pressure testing, at least 25% of the piping constructed

from the material under consideration must be pressure tested to 110 percent of the design pressure of any component within the boundary with test pressure being held for eight hours on an interval not to exceed 5 years.

(B) Internal inspection may be performed in lieu of the inspections described below. To credit internal inspection, at least 25% of the piping constructed from the material under consideration is internally inspected by a method capable of determining pipe wall thickness. The inspection method must be capable of detecting both general and pitting corrosion and must be qualified by Seabrook Station and accepted by the NRC. Internal inspections are to be conducted at an interval not to exceed 10 years.

Fire mains may be excluded from the inspection requirements below if they are subjected to either of the following two testing methods. The first is a flow test as described in section 7.3 of NFPA 25, at a frequency of at least one test in each one year period. The second is monitoring of the jockey pump operation for unexplained changes in activity at an interval not to exceed once per month. When unexplained changes in jockey pump activity are observed, a flow test is conducted by the end of the next refueling outage or as directed by current licensing basis, whichever is shorter, to determine if the piping system integrity has degraded unacceptably.

At Seabrook Station, the fire mains are maintained pressurized. Starts and running time of the fire protection jockey pumps are monitored and treated as an indicator of possible system leakage. This method of continuous monitoring pressure losses in the fire mains may be used in lieu of the NFPA 25 "Standard for the Installation of Private Fire Service Mains and Their Appurtenances" flow test to exclude the fire mains from the inspections described in the table below.

Bolting in buried, underground, and inaccessible submerged piping will be inspected for loss of material due to corrosion and bolted connections will be inspected for indication of leakage caused by loss of preload when the associated piping is inspected by this program. In instances where pressure testing, flow testing, or fire protection jockey pump monitoring are used in lieu of visual inspections, these methods will also be credited to identify leakage caused by loss of preload at bolted connections.

<u>Directed Inspections – Inaccessible Submerged Pipe</u>

The number of inspections required during each 10 year interval is shown in the tables below. With the exception of backfill and soil resistivity criteria, inaccessible submerged piping will be inspected to the same extent as buried piping. The aluminum bronze drain valves attached to these piping segments will

also be inspected for loss of material when the associated pipe segment is inspected.

Table 2 - Inspections of Buried, Underground Piping and Inaccessible Submerged Piping

Material	Prevention Action Categories	Inspections [1,2]	Systems Currently in Category
Stainless Steel		1 Inspection	CO, DG
Polymeric	Backfill is in accordance with preventive actions program element [3]	1 Inspection	FP
	Backfill is not in accordance with preventive actions program category [3]	The smaller of 1% of the length of pipe or 2 inspections	
Steel	C	The smaller of 0.5% of the piping length or 1 inspection	CBA, IA, FP, SW [6], AB [4], CO, DF, DG, FW, ASC, ASH
	D	The smaller of 1% of the piping length or 2 inspections	
	E	The smaller of 5% of the piping length or 3 inspections	
	F	The smaller of 10% of the piping length or 6 inspections	

Table 2 - Inspections of Buried, Underground Piping and Inaccessible Submerged Piping

Copper Alloy >15% Zinc	C	The smaller of 0.5% of the piping length or 1 inspection	SW [7]
	D	The smaller of 1% of the piping length or 2 inspections	
	E	The smaller of 5% of the piping length or 3 inspections	
	F	The smaller of 10% of the piping length or 6 inspections	

GENERAL NOTES:

1. When the inspections are based on the number of inspections in lieu of percentage of piping length, 10 feet of piping is exposed for each inspection.
2. When the percentage of inspections for a given material type results in an inspection quantity of less than 10 feet, then 10 feet of piping is inspected. If the entire run of piping of that material type is less than 10 feet in total length, then the entire run of piping is inspected.
3. The adequacy of backfill will be determined by the condition of coatings and base materials noted during inspections. If damage to the coatings or base materials is determined to have been caused by the backfill, the backfill will be considered to be "inadequate" (for the purpose of this program).
4. This line is not in use. It has been drained and flushed and is awaiting replacement. The inspection criteria for the replacement piping will be determined based material selection, coating, cathodic protection, and quality of backfill.
5. If Fire Protection piping is inspected by excavation in lieu of by alternative testing (e.g., flow test, jockey pump monitoring), and the extent of examinations is not based on the percentage of piping in the material group, the Not-to-Exceed (NTE) value will be increased by 1 inspection, if normally less than 10, or 2 inspections, if normally 10 or greater.
6. The Service Water vault located north of the cooling tower contains four 24" lines approximately 15' long. The valve pit located north of the cooling tower contains one 32" line less than 10' long.
7. Drain valves on the spools in the Service Water vault and valve pit are constructed of aluminum bronze (categorized as "copper alloy >15% zinc") with aluminum bronze body to bonnet bolting. These components will be inspected for loss of material when the respective Service Water spool piping is inspected by this program.

Table 3 - Preventive Action Categories

C: Category C Applies when:

a. Cathodic protection was installed or refurbished 5 years prior to the end of the inspection period of interest; and

b. Cathodic protection has operated at least 85 percent of the time since either 10 years prior to the period of extended operation or since installation / refurbishment, whichever is shorter. Time periods in which the cathodic protection system is off-line for testing do not have to be included in the total non-operating hours; and

c. Cathodic protection has provided effective protection for buried piping as evidenced by meeting the acceptance criteria in Section 3.6 of this AMP at least 80 percent of the time since either 10 years prior to the period of extended operation or since installation/refurbishment, whichever is shorter. As found results of annual surveys are to be used to demonstrate locations within the plant's population of buried pipe where cathodic protection acceptance criteria have, or have not, been met.

D:

Inspection criteria provided for Category D piping may be used for those portions of in-scope buried piping where it has been demonstrated, in accordance with the "preventive actions" program element of this AMP, that external corrosion control is not required.

E:

Inspection criteria provided for Category E piping may be used for those portions of the population of buried piping where:

a. An analysis, conducted in accordance with the "preventive actions" program element of this AMP, has demonstrated that installation or operation of a cathodic protection system is impractical; or

b. A cathodic protection system has been installed but all or portions of the piping covered by that system fail to meet any of the criteria of Category C piping above, provided:

i. Coatings and backfill are provided in accordance with the "preventive actions" program element of this AMP; and

ii. Plant-specific operating experience is acceptable (i.e., no leaks in buried piping due to external corrosion, no significant coating degradation or metal loss in more than 10 percent of inspections conducted); and

iii. Soil has been demonstrated to not be corrosive for the material type (e.g., AWWA C105, "Polyethylene Encasement for Ductile-Iron Pipe Systems," Table A.1, "Soil-Test Evaluation"). In order to demonstrate that the soil is not corrosive,

Table 3 - Preventive Action Categories

Seabrook will:

1) Obtain a minimum of three sets of soil samples in each soil environment (e.g., moisture content, soil composition) in the vicinity in which in-scope components are buried.

2) Tests the soil for soil resistivity, corrosion accelerating bacteria, pH, moisture, chlorides, sulfates, and redox potential.

3) Determines the potential soil corrosivity for each material type of buried in-scope piping. In addition to evaluating each individual parameter, the overall soil corrosivity is determined.

4) Conduct soil testing once in each 10-year period starting 10 years prior to the period of extended operation.

F:

Inspection criteria provided for Category F piping is used for those portions of in-scope buried piping which cannot be classified as Category C, D, or E (e.g. Buried or Underground piping that do not meet recommendations within the Preventive Action Table 1).

Plant-specific conditions can result in transitioning to a higher number of inspections than originally planned at the beginning of a 10-year interval. If a category transition (e.g. Category E to F) occurs in the latter half of the current 10-year interval, the timing of the additional examinations is based on the severity of the degradation identified and is commensurate with the consequences of a leak or loss of function, but in all cases, the examinations will be completed within 4 years after the end of the particular 10-year interval. The additional inspections conducted during the four years following the end of an inspection interval cannot also be credited towards the number of inspections stated in the inspection tables for the following 10-year interval.

Seabrook may utilize the following exceptions:

i. 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. For example, for Preventive Action Category F, 10 percent of the total of the associated steel, copper alloy, or aluminum alloy is inspected; or 6 10-foot segments of steel, copper alloy, or aluminum alloy piping is inspected.

ii. For buried piping, inspections may be reduced to one-half the number of inspections indicated in the above inspection tables when performance of the indicated inspections necessitates excavation of piping that has been fully backfilled using controlled low strength material. The inspection quantity is rounded up when one-half cannot be obtained. In conducting these inspections, the backfill may be excavated and the pipe examined, or the soil around the backfill may be excavated and the controlled low strength material backfill examined. The backfill inspection includes excavation of the top surfaces and at least 50 percent of the side surface to visually inspect for cracks in the backfill that could admit groundwater to the external surfaces of the component. When conducting inspection of backfill based on the number of inspections designated for that material type, 10 linear feet of the backfill is exposed for each inspection.

iii. No inspections are necessary if all the piping constructed from a specific material type is fully backfilled using controlled low strength material for: (a) polymeric materials; (b) steel and copper alloy materials when Preventive Action Category C is met; and (c) stainless steel materials.

iv. If all of the in-scope polymeric material is non-safety related, no more than one inspection needs to be conducted.

Transitioning to a Higher Number of Inspections

Plant-specific conditions can result in transitioning to a higher number of inspections than originally planned at the beginning of a 10-year interval. For example, degraded performance of the cathodic protection system could result in transitioning from Preventive Action Category C to Preventive Action Category E. Coating, backfill, or the condition of exposed piping that do not meet acceptance criteria could result in transitioning from Preventive Action Category E to Preventive Action Category F. If this transition occurs in the latter half of the current 10-year interval, the timing of the additional examinations is based on the severity of the degradation identified and is commensurate with the consequences of a leak or loss of function, but in all cases, the examinations are completed within 4 years after the end of the particular 10-year interval. These additional inspections conducted during the four years following the end of an inspection interval cannot also be credited towards the number of inspections stated in Table 3 for the following 10-year interval.

ELEMENT 5 - Monitoring and Trending

The results of previous inspections will be evaluated, and used to assess the condition of the external surfaces of other buried or underground steel, stainless

steel and polymer components, and to identify susceptible locations that may warrant further inspections.

For piping protected by cathodic protection, pipe to soil potential and cathodic protection current measurements will be monitored at least once a year and trended to identify changes in the effectiveness of the cathodic protection system.

For in-scope steel piping not protected by cathodic protection, where initial surveys have shown the soil to be non-corrosive, soil analyses will be performed at least once every 10 years to confirm whether or not the soil in the area of this piping is corrosive. Soil corrosivity is used as one factor in determining the number of locations to be inspected during the period of extended operation.

If aging of fire mains is managed through monitoring jockey pump activity (or similar parameter), jockey pump activity (or similar parameter) will be trended at least once a month to identify changes in pump activity that may be the result of increased leakage from buried fire main piping.

Where wall thickness measurements are conducted, the results should be trended if follow-up examinations are conducted.

ELEMENT 6 - Acceptance Criteria

For coated piping, there should be either no evidence of coating degradation or the type and extent of coating degradation should be insignificant as evaluated by an individual possessing a NACE Coating Inspector Program Level 2 or 3 inspector qualification, or an individual who has attended the EPRI Comprehensive Coatings Course and completed the EPRI Buried Pipe Condition Assessment and Repair Training Computer Based Training Course, or a coatings specialist qualified in accordance with an ASTM standard endorsed in Regulatory Guide 1.54, Rev. 2, "Service Level I, II, and III Protective Coatings Applied to Nuclear Power Plants."

Where damage to the coating has been evaluated as significant and the damage was caused by non-conforming backfill, an extent of condition evaluation should be conducted to ensure that the as-left condition of backfill in the vicinity of observed damage will not lead to further degradation. Any coating and wrapping degradation will be documented and evaluated under the corrective action program. Where the protective coating consists of paint with no other coating or wrapping (e.g., drop-out spools in the Service Water vault), inspection of the painted surface should confirm no evidence of coating degradation (exposed metal) or degradation of the pipe surface due to corrosion.

Cracking or blistering of polymer piping is evaluated under the corrective action program.

Criteria for pipe to soil potential when using a saturated copper/copper sulfate reference electrode for steel piping is -850 mV relative to a CSE, instant off. To prevent damage to the coating, the limiting critical potential should not be more negative than -1200 mV.

Alternatives to the -850 mV criterion for steel piping include the following:

- 100 mV minimum polarization.

- -750 mV relative to a CSE, instant off where soil resistivity is greater than 10,000 ohm-cm to less than 100,000 ohm-cm.

- -650 mV relative to a CSE, instant off where soil resistivity is greater than 100,000 ohm-cm.

- Verify less than 1 mpy loss of material. Loss of material rates in excess of 1 mpy may be acceptable if an engineering evaluation demonstrates that the corrosion rate would not result in a loss of intended function prior to the end of the period of extended operation.

When using the 100 mV, -750 mV, or -650 mV polarization criteria as an alternative to the -850 mV criterion for steel piping, means to verify the effectiveness of the protection of the most anodic metal is incorporated into the program. One acceptable means to verify the effectiveness of the cathodic protection system, or to demonstrate that the loss of material rate is acceptable, is to use installed electrical resistance corrosion rate probes. The external loss of material rate is verified:

- Every year when verifying the effectiveness of the cathodic protection system by measuring the loss of material rate.

- Every 2 years when using the 100 mV minimum polarization.

- Every 5 years when using the -750 or -650 criteria associated with higher resistivity soils. The soil resistivity is verified every 5 years.

As an alternative to verifying the effectiveness of the cathodic protection system every 5 years, soil resistivity testing is conducted annually during a period of time when the soil resistivity would be expected to be at its lowest value (e.g., maximum rainfall periods). Upon completion of 10 annual consecutive soil samples, soil resistivity testing can be extended to every 5 years if the results of the soil sample tests consistently verified that the resistivity did not fall outside of the range being credited (e.g., for the -750 mV relative to a CSE, instant off criterion, all soil resistivity values were greater than 10,000 ohm-cm).

When electrical resistance corrosion rate probes will be used, the application identifies:

- The qualifications of the individuals that will determine the installation locations of the probes and the methods of use (e.g., NACE CP4, "Cathodic Protection Specialist").

- How the impact of significant site features (e.g., large cathodic protection current collectors, shielding due to large objects located in the vicinity of the protected piping) and local soil conditions will be factored into placement of the probes and use of probe data. Soil corrosivity is determined by soil analysis. If the calculated corrosion index value is greater than 10 points (i.e., corrosive soil) the number of inspection locations for non-cathodically protected steel piping is increased as shown in Element 4 above.

Backfill is consistent with SP0169-2007 section 5.2.3. Backfill located within 6 inches of steel and stainless steel pipe that meets ASTM D 448-08 size number 67 meets the objectives of SP0169-2007. Backfill located within 6 inches of polymeric pipe that meets ASTM D 448-08 size number 10 meets the objectives of SP0169-2007. Backfill quality may be demonstrated by plant records or by examining the backfill while conducting the inspections conducted in accordance with this program. Backfill not meeting this standard, in either the initial or subsequent inspections, is acceptable if the inspections conducted in accordance with this program do not reveal evidence of mechanical damage to pipe coatings due to the backfill.

Flow test results for fire mains, if credited in lieu of visual inspections, are in accordance with NFPA 25 section 7.3.

Unexplained changes in jockey pump activity (or similar parameter), if credited in lieu of visual inspections, are evaluated under the corrective action program.

When fire water system leak rate testing is conducted, leak rates are within acceptance limits of plant-specific documents.

For pressure tests, the test acceptance criteria is no visible indications of leakage and no drop in pressure within the isolated portion of the piping that is not accounted for by a temperature change in the test media or quantified leakage across test boundary valves.

Evaluation of all adverse indications (e.g., leaks, cracks, material thickness less than minimum, coarse backfill with accompanying coating degradation, and general or local degradation of coatings so as to expose the base material) is conducted in accordance with the corrective action program. Any expansion of the inspection sample size is one facet of this evaluation when determining extent of condition.

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.

Measured wall thickness projected to the end of the period of extended operation meets minimum wall thickness requirements, or proper corrective actions are in place prior to reaching the projected minimum wall thickness requirements.

ELEMENT 7 - Corrective Actions

Adverse indications will be entered into the Seabrook Station Corrective Action Program for appropriate disposition.

Where damage to the coating has been evaluated as significant and the damage was caused by nonconforming backfill, an extent of condition evaluation is conducted to determine the extent of degraded backfill in the vicinity of the observed damage.

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.

Where the coatings, backfill, or the condition of exposed piping does not meet acceptance criteria, the degraded condition is repaired or the affected component is replaced. In addition, where the depth or extent of degradation of the base metal could have resulted in a loss of pressure boundary function when the loss of material is extrapolated to the end of the period of extended operation, an expansion of sample size is conducted. The number of inspections within the affected piping categories are doubled or increased by 5, whichever is smaller. If the acceptance criteria are not met in any of the expanded samples, an analysis is conducted to determine the extent of condition and extent of cause. The number of follow-on inspections is determined based on the extent of condition and extent of cause.

The timing of the additional examinations is based on the severity of the degradation identified and is commensurate with the consequences of a leak or loss of function. However, in all cases, the expanded sample inspection is completed within the 10-year interval in which the original inspection was conducted or, if identified in the latter half of the current 10-year interval, within 4 years after the end of the 10-year interval. These additional inspections conducted during the four years following the end of an inspection interval cannot

also be credited towards the number of inspections in the Inspection Tables in Element 4 – Detection of Aging Effects, for the following 10 year interval. The number of inspections may be limited by the extent of piping or tanks subject to the observed degradation mechanism.

The expansion of sample inspections may be halted in a piping system or portion of system that will be replaced within the 10-year interval in which the inspections were conducted or, if identified in the latter half of the current 10-year interval, within 4 years after the end of the 10-year interval.

Unacceptable cathodic protection survey results are entered into the plant corrective action program.

Sources of leakage detected during pressure tests are identified and corrected.

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.

Indications of cracking are evaluated in accordance with applicable codes and Seabrook-specific design criteria.

ELEMENT 8 - Confirmation Process

NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 8, Confirmation Process.

ELEMENT 9 - Administrative Controls

NextEra Energy Quality Assurance Program and Nuclear Fleet procedures will be utilized to meet Element 9, Administrative Controls.

ELEMENT 10 - Operating Experience

The primary source of OE, both industry and plant specific, was the Seabrook Station Corrective Actions Program documentation. The Seabrook Station Corrective Action Program is used to document review of relevant external OE including INPO documents, NRC communications and Westinghouse documents, and plant specific OE including corrective actions, maintenance work orders generated in response to a structure, system or component failure,

system and program health reports, self-assessment reports and NRC and INPO inspection reports.

The Seabrook Station Corrective Action Program is used to track, trend and evaluate plant issues and events. Those issues and events, whether external or plant specific, that are potentially significant to the Buried Piping and Tanks Program Inspection Program are evaluated. The Buried Piping and Tanks Program Inspection Program is augmented, as appropriate, if these evaluations show that program changes will enhance program effectiveness.

A review of industry related operating experience related to the Buried Piping and Tanks Program was performed. The review includes NRC generic communications issued, in the form of Generic Letters, Bulletins, and Information Notices.

Industry operating experience is discussed below:

1. OE 28335 and OE 29126 – Indian Point 2 - 2/15/2009

   Buried Condensate return pipe was found to be leaking, which was discovered by a Nuclear Plant Operator who observed water filling the floor guard collar on the Condensate return line and spilling onto the floor in the Auxiliary Feedwater Building. The leak rate was determined to be approximately 5 cc/min from the sleeve with an estimated 15 to 20 gpm underground. The through-wall area was approximately 1" X ¼" and appeared to have resulted from failure of the coal-tar saturated asbestos outer-wrapper. The return line was an unlined carbon-steel pipe and was original equipment from construction.

2. OE 29020 – Oyster Creek – 4/15/2009

   Elevated Tritium concentrations were identified at Oyster Creek during preparation for work inside the emergency service water vault. The root cause of these leaks was determined to be the corrosion mechanism known as anodic dissolution resulting from poor application of coating that left the buried pipes susceptible to corrosion.

3. OE 29214 – Dresden – 6/9/2009

   During routine environmental sampling of storm drains and sample wells, elevated levels of tritium were identified in the storm drain system. During the investigation, it was identified that the source of the tritium was a leaking standpipe within the Condensate Storage Tank and a pinhole leak in a 4-inch clean demineralized water pipe utilized to fill the Condensate Storage Tank. A root cause investigation determined the through-wall leaks to be the result of external corrosion due to degraded protective moisture barrier wrap.

4. NUREG-1801, Revision 2 - December 2010

   Although Revision 2 of NUREG-1801 (GALL) was issued subsequent to the initial issue of this program, early versions of the revision were reviewed as industry operating experience and incorporated into the Seabrook Buried Piping Aging Management Program where appropriate. On final issue of the GALL Revision 2, a gap analysis was performed to determine whether or not the Seabrook program required additional revision.

5. LR-ISG-2011-03

   In July of 2012, Interim Staff Guidance (ISG) LR-ISG-2011-03 was issued in its final form. The ISG made additional changes to GALL Revision 2 to incorporate industry experience that occurred during and subsequent to the preparation of GALL Revision 2. The ISG was used in preparation of a revised Seabrook Buried Piping Aging Management Program.

   The Seabrook Station plant specific operating experience identified the following:

1. Seabrook Station has no history of failures of buried piping leading to loss of function of a component within the scope of license renewal.
2. Extensive visual inspection of buried Service Water system piping interior surfaces has been conducted since Refueling Outage 4 (Fall of 1995) with no indications of pipe wall degradation. The piping is cement lined, but degradation from the exterior surface is expected to lead to staining of the cement liner as water and corrosion products reach the inner surface of the pipe wall. When staining of the cement liner is found, the liner material is removed in order to evaluate the surface condition of the underlying pipe. Ultrasonic thickness measurements are taken to determine any degradation of the pipe wall. Such information, combined with no indication of interior pipe surface degradation, would indicate wall thinning caused by external environmental conditions. To date, there has been no indication of through wall leakage in the buried Service Water piping either originating from the inside surface or the outside surface. This example demonstrates one alternate indirect inspection method used to identify exterior surface degradation.
3. In November 2000, the Auxiliary Boiler buried fuel supply line was determined to be leaking diesel fuel into the surrounding soil. A small leak was discovered in the buried carbon steel pipe in an area where the bituminous wrap had been damaged. The fuel-contaminated soil was removed and with the concurrence of the New Hampshire Department of Environmental Services, the leak was temporarily repaired. In June 2001, after an examination of the failed section of pipe and visual/ultrasonic inspections at several excavations along the piping run, further pipe deterioration was discovered and it was ultimately decided that the existing pipe would not be

returned to service. A design change was initiated to replace the piping with dual-wall pipe meeting newly passed state requirements. A temporary modification was created to provide fuel oil during the period of implementation of this design change.

4. In March of 2001, a service vendor noticed oil drops coming from the ground around the fuel oil pumps at the vehicle maintenance shop. After excavation, the source of the leak was found to be at a threaded joint. An evaluation of the condition determined that the most likely cause of the pipeline leakage was the loosening of the joints over time due to temperature changes and frost heaving. The pumping station and underground piping were removed and a new pumping station and dual-wall underground piping with leak detection capability were installed. This piping is not in the scope of license renewal, but the example demonstrates appropriate investigation of and response to identified degradation of buried piping.

5. In April of 2003, an underground leak was identified in four inch sanitary drainage piping, which is fabricated from schedule 40, hot-dipped zinc coated, steel pipe in accordance with AWWA specification A120. The sanitary drainage piping was assembled with malleable iron screwed and galvanized fittings. The subject piping was wrapped with a coal-tar protective coating in accordance with AWWA specification C203.

   Upon inspection, it was reported that the overall condition of the coal-tar protective coating was intact and in very good condition with the exception of the area where the through wall leakage had occurred. The perforation in the coating was located at the pipe to pipe fitting intersection at an area that had coal-tar protective coating applied in place during installation.

   NextEra Energy determined that the coal-tar protective coating was probably damaged at some point during or after the piping was installed and tested. A nine inch section of the pipe was replaced, wrapped with protective coating, and holiday tested.

6. A branch connection was installed in a 6 inch buried Fire Protection system line by a Seabrook Station work order in 2007. When excavated, the existing carbon steel pipe was inspected and showed no degradation of the coating or external surfaces.

7. Following excavation to repair a Fire Protection valve in September 2008, minor damage to the external tape coat on a 12" carbon steel Fire Protection line was found. Engineering was notified and the condition documented in the Seabrook Station Corrective Action Program. An inspection report was issued providing pictures of the piping and included documentation that the coating was worn but no metal (pipe) was exposed, and that there were no signs of backfill embedded in the coating. The coating was repaired and the area backfilled. This example demonstrates the appropriate notifications and inspections utilized when opportunistic observations detect evidence of conditions that could affect the integrity of buried piping.

8. Following an EPRI workshop on buried piping, the Seabrook Station attendees presented a case for development of a buried pipe program. A plan was developed and appropriate actions assigned in the Seabrook Station Corrective Action Program to implement this program. Specific actions were assigned in the Corrective Action Program in November 2007. Underground piping was identified and inventoried by the respective system engineers, and a Buried Piping System Health Report generated. This health report is issued periodically by the assigned System Engineer. Seabrook Station procedures are being developed and will form the bases for this program.
9. In December of 2007, an engineering change was implemented which replaced depleting underground sacrificial anodes and retuned rectifier tap settings to provide proper protection for the underground piping. The new potential criterion as defined by NACE SP0169-2007, "Standard Practice, Control of External Corrosion on Underground or Submerged Metallic Piping Systems" for underground steel piping was also implemented. Subsequent surveillances of the underground cathodic protection system showed no degraded conditions and indicated that the cathodic protection system is within the NACE recommendations for pipe-to-soil potentials.
10. LR-ISG-2015-01 was issued and utilized in the development of the Seabrook Station Buried Piping and Tanks Inspection Program.

These examples of operating experience provide evidence that the Buried Piping and Tanks Inspection Program will adequately monitor the aging effects and that Seabrook Station is maintaining an awareness and sensitivity to operating experiences throughout the industry that could impact this program. Additional industry Operating Experience will be evaluated as it becomes available, with Seabrook specific Corrective Actions being developed as necessary.

Exceptions to NUREG-1800

None.

Enhancements

None.

Conclusion

The Seabrook Station Aging Management Program for Buried Piping and Tanks Inspection provides reasonable assurance that the aging effects will be adequately managed such that applicable components will continue to perform their intended functions consistent with the current licensing basis for the period of extended operation.