Entergy

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William F. Maguire
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RBG-47850

April 4, 2018

Attn: Document Control Desk
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738

SUBJECT: Response to License Renewal Application NRC Request for Additional Information Set 5 Supplement
River Bend Station, Unit 1
Docket No. 50-458
License No. NPF-47

References: 1) Entergy Letter: License Renewal Application (RBG-47735 dated May 25, 2017)

2) NRC email: River Bend Station, Unit 1, Request for Additional Information, Set 5 – RBS License Renewal Application – dated December 13, 2017 (ADAMS Accession No. ML17347B432)

3) Entergy Letter: Response to Request for Additional Information Set 5 – dated January 24, 2018 (ADAMS Accession No. ML18025B750)

4) Public Phone Call – Discuss RAIs B.1.4-1, and B.1.4-2, Buried Pipe – dated March 28, 2018 (ADAMS Accession No. ML18078A755)

Dear Sir or Madam:

In Reference 1, Entergy Operations, Inc (Entergy) submitted an application for renewal of the operating license for River Bend Station (RBS) for an additional 20 years beyond the current expiration date. In an email dated December 13, 2017, (Reference 2) the NRC staff made a Request for Additional Information (RAI), needed to complete the license renewal application review. On January 24, 2018, Entergy responded to the RAI Set 5 request (Reference 3). On March 6, 2018, (Reference 4) during a public phone call, the NRC staff requested additional information on the Entergy response to RAIs B.1.4-1 and B.1.4-2 that was provided in Reference 3. Enclosure 1 provides a revised response to this RAI that includes the additional information requested.

If you require additional information, please contact Mr. Tim Schenk at (225)-381-4177 or tschenk@entergy.com.

In accordance with 10 CFR 50.91(b)(1), Entergy is notifying the State of Louisiana and the State of Texas by transmitting a copy of this letter to the designated State Official.

I declare under penalty of perjury that the foregoing is true and correct. Executed on April 4, 2018.

Sincerely,

for WFM/RMC/alc

Enclosure 1: Set 5 Supplement RAI Response – River Bend Station

cc: (with Enclosure)
U. S. Nuclear Regulatory Commission
Attn: Emmanuel Sayoc
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cc: (w/o Enclosure)
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RBF1-18-0055

RBG-47850

Enclosure 1

Response to Request for Additional Information

Set 5 Supplement

REQUEST FOR ADDITIONAL INFORMATION
LICENSE RENEWAL APPLICATION
RIVER BEND STATION, UNIT 1 – SET 5 SUPPLEMENT
DOCKET NO.: 50-458
CAC NO.: MF9757
Office of Nuclear Reactor Regulation
Division of Materials and License Renewal

Question
RAI B.1.4-1 (Buried Pipe)

Background
The "preventive actions" program element of GALL Report AMP XI.M41, "Buried and Underground Piping and Tanks," as modified by LR-ISG-2015-01, "Changes to Buried and Underground Piping and Tank Recommendations," includes the following recommendations.

For buried stainless steel piping or tanks, coatings are provided based on the environmental conditions (e.g., stainless steel in chloride containing environments). Applicants provide justification when coatings are not provided.

Coatings are in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002 as well as the following coating types: asphalt/coal tar enamel, concrete, elastomeric polychloroprene, mastic (asphaltic), epoxy polyethylene, polypropylene, polyurethane, and zinc.

For buried steel, copper alloy, and aluminum alloy piping and tanks and underground steel and copper alloy piping and tanks, coatings are in accordance with Table 1 of NACE SP0169-2007 or Section 3.4 of NACE RP0285-2002.

GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, Table XI.M41-2, "Inspection of Buried and Underground Piping and Tanks," recommends the following:

- In regard to the inspection quantities in Table XI.M41-2, the "detection of aging effects" program element states, "[a]dditional inspections, beyond those in Table XI.M41-2 may be appropriate if exceptions are taken to program element 2, "preventive actions," or in response to plant-specific operating experience."
- One inspection per 10-year interval for stainless steel piping (reference Table XI.M41-2).
- Use of Preventive Action Category F, the highest number of inspections category, for those portions of in-scope buried steel piping which cannot be classified as Category C, D, or E.

Issue
During the audit, the staff reviewed condition reports and plant-specific documents related to buried steel and stainless steel piping. The staff concluded the following:

- It is unclear whether all in-scope steel piping is coated.
- For at least portions of the stainless steel condensate makeup, storage, and transfer system piping, no coating was installed.
- Based on the availability of soil sample parameter results, it is not clear that the soil is

noncorrosive because redox potential values and soil drainage assessments were not available, and based on the presence of sulfides, a significant corrosivity penalty is applied. In addition, particularly in regard to stainless steel piping, chloride values were not available.

Request

1. For steel piping:

a. State what type and whether coatings were specified to be applied to all in-scope steel buried piping. If the types of coatings are not consistent with the recommended coating types in AMP XI.M41, state the basis for their effectiveness at preventing aging effects for buried steel piping.

b. If coatings were not specified to be applied to all in-scope steel buried piping (in essence, an exception to AMP XI.M41 preventive actions), state which Preventive Action Category will be used for those portions of in-scope buried steel piping that were not specified to be coated. If Preventive Action Category F will not be used for those portions of in-scope buried steel piping that were not specified to be coated, state the basis for why additional inspections, beyond those in Table XI.M41-2, are not required to provide reasonable assurance that the piping will meet its intended function during the period of extended operation.

c. Provide sufficient data to demonstrate that for where in-scope steel piping is buried, the soil is not corrosive.

d. If the soil is corrosive or cannot be demonstrated to be noncorrosive; state which Preventive Action Category will be used for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness). If Preventive Action Category F will not be used for those portions of in-scope buried steel piping where the cathodic protection system is not meeting performance goals, state the basis for why additional inspections, beyond those in Table XI.M41-2, are not required to provide reasonable assurance that the piping will meet its intended function during the period of extended operation.

2. For stainless steel piping:

a. State what type and whether coatings were specified to be applied to all in-scope stainless steel buried piping. If the types of coatings are not consistent with the recommended coating types in AMP XI.M41, state the basis for their effectiveness at preventing aging effects for buried stainless steel piping.

b. For portions of the in-scope buried stainless steel piping that are not coated (by design configuration or as detected during inspections), state how many inspections will be conducted per 10-year period and the basis for why the number of inspections will be adequate to manage associated aging effects.

Response

River Bend Station (RBS) previously responded to RAI B.1.4-1 by letter dated January 24, 2018 (RBG 47813). The following is the response to RAI B.1.4-1 revised to include additional information requested by the NRC during a public telephone conference call held on March 6, 2018 as well as a change to reflect updated design information regarding the type of coating applied to buried stainless steel piping. The revised response supersedes the previous response. Changes to the previous response are shown with additions underlined and deletions lined through.

1.a. RBS design documents specify the application of coal tar epoxy coating to the buried steel

piping in the systems that are within the scope of license renewal. A substitute coating of Tnemec HS 104 epoxy, which is a cycloaliphatic amine epoxy, is allowed by the specification for field-installed piping. Entergy believes that applications of the Tnemec coating are few, if any. While not included in the recommended coating types of AMP XI.M41, the Tnemec HS 104 does conform to the recommendations of American Water Works Association (AWWA) C210 "Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings" when installed in underground and underwater applications. It protects in immersion, salt spray and chemical exposures, and is applied in two coats at a minimum 6 mil dry film thickness each. It has superior abrasion resistance. As such it is an appropriate coating for preventing aging effects on steel piping.

b. Coatings were specified to be applied to all in-scope buried steel piping, and as such no further response is necessary for this question. A 2013 condition report documented one instance of buried steel piping that was discovered without protective coating. That piping ran from a drip pan under condensate transfer pumps to the condensate storage tank sump. The piping, which performs no license renewal intended function, had been installed in a 1986 plant modification that included inadequate directions for coating application. This condition is considered an isolated event and the modification process has been improved since 1986 to provide more specific installation instructions.

c. Site documentation is not adequate to demonstrate that the soil at the site is noncorrosive in accordance with the guidance in Table XI.M41-2.

d. Because the soil at the site has not been demonstrated noncorrosive, Preventive Action Category F of Appendix B of License Renewal Interim Staff Guidance LR-ISG-2015-01 will be used to determine the number of inspections for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness) or where the piping is not protected by a cathodic protection system unless all the requirements for moving to another preventive action category are met. This provision is added to Appendix A, Section A.1.4 and Appendix B, Section B.1.4.

2.a. Site documentation specifies that buried stainless steel piping is coated with coal tar epoxy, consistent with the recommended coating types in AMP XI.M41, or a silicone-based material. The silicone material is specified as Thurmalox 70 or Carboline 4674 and is applied in two coats. These silicone-based coating materials are rated for use in high-temperature applications and provide an additional layer of protection from the soil environment. The Thurmalox coating provides protection from chloride-induced stress corrosion cracking by preventing chlorides in the environment from coming in contact with the surface. Inspectors did not identify corrosion of stainless steel piping during piping inspections in 2012 and 2013, which provides confirmation that these coating materials are protecting the stainless steel piping at RBS. This includes buried stainless steel piping that is subject to aging management review for license renewal.

b. The stainless steel piping in a soil environment is specified to be coated. Entergy has identified no buried stainless steel piping subject to aging management review that was not coated prior to installation.

The changes to LRA A.1.4 and B.1.4 follow with additions underlined and deletions lined through.

[The following revised LRA sections reflect changes to the RAI response submitted on January 24,2018]

A.1.4 Buried and Underground Piping and Tanks Inspection

The Buried and Underground Piping and Tanks Inspection Program manages the effects of aging on external surfaces of buried piping components and tanks subject to aging management review. Components included in the program are fabricated from metallic materials. The program will manage loss of material and cracking through preventive and mitigative features (e.g., coatings, backfill quality, and cathodic protection) and periodic inspection activities during opportunistic and directed excavations. The number of inspections is based on the availability and effectiveness of preventive and mitigative actions as specified in Appendix B of License Renewal Interim Staff Guidance LR-ISG-2015-01. Preventive Action Category F will be used in determining the number of inspections for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness) or where the piping is not protected by a cathodic protection system unless all the requirements for moving to another preventive action category are met ~~soil is demonstrated to be noncorrosive~~. Annual cathodic protection surveys are conducted. For steel components, where the acceptance criteria for effectiveness of cathodic protection is other than -850 millivolts (mV) instant off, loss of material rates are measured.

B.1.4 BURIED AND UNDERGROUND PIPING AND TANKS INSPECTION

Program Description

The Buried and Underground Piping and Tanks Inspection Program is a new program that will manage the effects of aging on external surfaces of buried piping components and tanks subject to aging management review. Components included in the program are fabricated from metallic materials. The program will manage loss of material and cracking through preventive and mitigative features (e.g., coatings, backfill quality, and cathodic protection) and periodic inspection activities during opportunistic and directed excavations. The number of inspections is based on the availability and effectiveness of preventive and mitigative actions as specified in Appendix B of License Renewal Interim Staff Guidance LR-ISG-2015-01. Preventive Action Category F will be used in determining the number of inspections for portions of the in-scope buried steel piping where the cathodic protection system is not meeting performance goals (i.e., operational time period, effectiveness) or where the piping is not protected by a cathodic protection system unless all the requirements for moving to another preventive action category are met ~~soil is demonstrated to be noncorrosive~~. Annual cathodic protection surveys are conducted. For steel components, where the acceptance criteria for effectiveness of cathodic protection is other than -850 mV instant off, loss of material rates are measured.

Question
RAI B.1.4-2 (Buried Pipe)

Background
During the audit, the staff reviewed cathodic protection surveys which documented test station voltage readings ranging from approximately +0.1 to -1.9 volts direct current (VDC) relative to a copper/ copper sulfate reference electrode (CSE). The "preventive actions" program element of GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, states that to prevent damage to the coating or base metal, the limiting critical potential should not be more negative than -1200 millivolts (mV) relative to a CSE, instant-off.

The "detection of aging effects" program element of GALL Report AMP XI.M41, as modified by LR-ISG-2015-01, states that piping inspection locations are selected based on characteristics such as coating type, coating condition, cathodic protection efficacy, backfill characteristics, soil resistivity, pipe contents, and pipe function.

Issue
The staff notes that cathodic protection efficacy (i.e., test station voltage readings more negative than -850 mV) is a characteristic that determines piping inspection location; however, it is unclear to the staff why exceeding the limiting critical potential (i.e., test station voltage readings more negative than -1200 mV) is not a characteristic that determines piping inspection location given that cathodic protection surveys have documented test station voltage readings as negative as -1900 mV relative to a CSE.

Request
Provide a basis for why exceeding the limiting critical potential of -1,200 mV relative to a CSE did not result in damage to coatings or the base metal, or state the changes to the "detection of aging effects" program element necessary to include exceeding the limiting critical potential as a criterion when determining piping inspection locations.

Response
River Bend Station (RBS) previously responded to RAI B.1.4-2 by letter dated January 24, 2018 (RBG 47813). The following is the response to RAI B.1.4-2 revised to include additional information requested by the NRC during a public telephone conference call held on March 6, 2018. The revised response supersedes the response. Changes to the previous response are shown with additions underlined and deletions lined through.

To ensure that coating or base metal has not been damaged by exceeding the limiting critical potential of -1200 mV, a criterion for selecting buried and underground piping inspection locations in addition to those specified in XI.M41 will be included in the program as part of the detection of aging effects element. The additional criterion will be; In scope piping protected by cathodic protection that is located in areas exceeding the limiting critical potential of -1200 mV ~~in more than one survey~~. The number of times and the magnitude by which the criterion is exceeded at specific locations are evaluated when determining inspection locations.

The changes to LRA Sections A.1.4 and B.1.4 follow with additions underlined and deletions lined through.

[The following revised LRA sections reflect changes to the RAI response submitted on January 24, 2018]

A.1.4 Buried and Underground Piping and Tanks Inspection

The Buried and Underground Piping and Tanks Inspection Program manages the effects of aging on external surfaces of buried piping components and tanks subject to aging management review. Components included in the program are fabricated from metallic materials. The program will manage loss of material and cracking through preventive and mitigative features (e.g., coatings, backfill quality, and cathodic protection) and periodic inspection activities during opportunistic and directed excavations. The number of inspections is based on the availability and effectiveness of preventive and mitigative actions. Annual cathodic protection surveys are conducted. For steel components, where the acceptance criteria for effectiveness of cathodic protection is other than -850 millivolts (mV) instant off, loss of material rates are measured. The criterion for determining piping inspection locations will include; In scope piping protected by cathodic protection that is located in areas exceeding the limiting critical potential of -1200 mV ~~in more than one survey~~. The number of times and the magnitude by which the criterion is exceeded at specific locations are evaluated when determining inspection locations.

B.1.4 BURIED AND UNDERGROUND PIPING AND TANKS INSPECTION

Program Description

The Buried and Underground Piping and Tanks Inspection Program is a new program that will manage the effects of aging on external surfaces of buried piping components and tanks subject to aging management review. Components included in the program are fabricated from metallic materials. The program will manage loss of material and cracking through preventive and mitigative features (e.g., coatings, backfill quality, and cathodic protection) and periodic inspection activities during opportunistic and directed excavations. The number of inspections is based on the availability and effectiveness of preventive and mitigative actions. Annual cathodic protection surveys are conducted. For steel components, where the acceptance criteria for effectiveness of cathodic protection is other than -850 mV instant off, loss of material rates are measured. The criterion for determining piping inspection locations will include; In scope piping protected by cathodic protection that is located in areas exceeding the limiting critical potential of -1200 mV ~~in more than one survey~~. The number of times and the magnitude by which the criterion is exceeded at specific locations are evaluated when determining inspection locations.