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GNRO-2015/00034

May 20, 2015

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

SUBJECT: Response to Request for Additional Information (RAI) Set 52 dated April 6, 2015
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

REFERENCES: 1. U.S. NRC Letter, "Request for Additional Information for the Review of Grand Gulf Nuclear Station, License Renewal Application, Set 52" dated April 6, 2015 (GNRI-2015/00020)
2. Entergy Letter, "Response to Request for Additional Information (RAI) Set 51 dated November 6, 2014 (GNRO-2014/00076)

Dear Sir or Madam:

Entergy Operations, Inc. is providing, in Attachment 1, the response to the referenced Request for Additional Information (RAI) Set 52.

This letter contains changes to existing commitments as documented in Attachment 2.

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

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 19th day of May, 2015.

Sincerely,

A handwritten signature in black ink, appearing to be "Kevin Mulligan", written over a horizontal line.

KJM/ras

Attachments:

1. Response to Request for Additional Information (RAI) set 52
2. Changes to License Renewal Application

cc: with Attachments

U.S. Nuclear Regulatory Commission
ATTN: Ms. Rebecca Richardson, NRR/DLR
Project Manager
Office of License Renewal
Mail Stop O-11 F1
Washington, DC 20555

cc: without Attachments

U.S. Nuclear Regulatory Commission
ATTN: Mr. Mark Dapas
Regional Administrator, Region IV
U.S. Nuclear Regulatory Commission
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U.S. Nuclear Regulatory Commission
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Rockville, MD 20852-2378

NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

**Attachment 1 to
GNRO-2015/00034
Response to Requests for Additional Information (RAI)
Set 52**

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

RAI 3.0.3-1-FWS-1a

Background

As amended by letter dated November 6, 2014, an enhancement to the “detection of aging effects” program element of the Fire Water System Program described in LRA Section B.1.21 states that “main drain tests are performed consistent with NFPA 25... (Section) 13.2.5...” and that a flow blockage evaluation will be conducted, “if during main drain testing the flowing pressure drops more than 10 percent from the previous test in the same location (emphasis added).”

Issue

The amended program element is not consistent with National Fire Protection Association (NFPA) 25 Section 13.2.5, which states that the 10 percent reduction in full flow pressure should be compared to the original acceptance test or previously performed tests. By comparing the result of the main drain test to only the previous test, decreases in full flow pressure (indicative of potential flow blockage) could accumulate over time and exceed a 10 percent reduction in flow.

Request

Please address this inconsistency and provide an adequate basis for how comparing the current test result to only the previous test result will be effective in determining whether potential flow blockage is occurring and how effective trending can be accomplished.

RAI 3.0.3-1-FWS-1a Response

The enhancement described in the letter dated November 6, 2014 (Accession No. ML14311A694) is clarified to read, “Revise Fire Water System procedures to perform a flow blockage evaluation if during main drain testing, the flowing pressure drops more than 10 percent from the flowing pressure observed during the original acceptance test or other previously performed tests at the same location.”

RAI 3.0.3-1-FWS-2a

Background

As amended by letter dated May 13, 2014, LRA Section B.1.21 states an exception to the “detection of aging effects” program element. This exception states that adhesion testing will not be conducted on the internal surfaces of fire water storage tanks in accordance with ASTM D 3359, “Standard Test Methods for Measuring Adhesion by Tape Test,” as cited by NFPA 25 Section 9.2.7. An enhancement to the “corrective actions” program element states that dry film thickness measurements, spot wet-sponge tests, and ultrasonic thickness checks of any identified corroded areas will be conducted.

The response to RAI 3.0.3-1-FWS-2 dated November 6, 2014, states that adhesion testing, in accordance with ASTM D 3359, would not be conducted because the recommended type of adhesion testing is destructive, variability of test results can occur, and the length of time required to conduct repairs could result in entry into Technical Requirements Manual limiting conditions for operation.

Issue

An alternative to adhesion testing was not proposed.

Request

State how potential peeling, delamination, or blistering, or the extent of these aging mechanisms, would be detected by dry film thickness measurements, spot wet-sponge tests, or ultrasonic wall thickness measurements, or propose an alternative to the adhesion testing cited in NFPA 25.

RAI 3.0.3-1-FWS-2a Response

Dry film thickness and spot wet-sponge tests are used to identify holidays in coatings. Holidays consist of defects in the coating such as thin areas, cracks, blisters, delamination, and peeling that may not be visible to the naked eye. The initial qualitative extent of these conditions on the fire water tank interior coating are detected using a visual inspection per NFPA 25 (2011 Edition) Section 9.2.6.4. In accordance with the Corrective Action Program and NFPA 25, Section 9.2.7, any signs of coating/tank degradation require further evaluation to quantify the extent and determine if the tank can be returned to service without repairing, replacing or removing the defective coating. If the fire water tank is returned to service without repairing, replacing or removing the coating, a coating specialist, qualified in accordance with an ASTM international standard endorsed by RG 1.54, and design engineering evaluate the extent of the coating degradation and must conclude that the tank can perform its design function until the next scheduled inspection.

The qualified coating inspector and design engineering determine the type of coating degradation testing. Although coating degradation testing may consist of destructive adhesion testing as described in ASTM 3359, non-destructive adhesion testing is the preferred method. The type of adhesion testing is based on the evaluation of the specific condition. For example, ASTM D 714-87, or a later revision, would be used to categorize the blisters according to size

and frequency. A fire water tank with blisters in the coating would only be returned to service with a few intact small blisters that are completely surrounded by sound coating bonded to the substrate.

The coating system applied to the GGNS fire water tanks consists of multiple layers. If delamination or peeling were occurring, the tank would only be returned to service if:

1. The delaminated or peeling coating was removed,
2. The exposed underlying coating was verified to be securely bonded to the substrate as determined by an adhesion test, and
3. The outermost coating was feathered and the remaining outermost coating was determined to be securely bonded to the coating below via an adhesion test.

RG 1.54 describes the use ASTM test standard D 4541-09, "Pull-Off Strength of Coatings Using Portable Adhesion Testers" as an acceptable alternative method for performing adhesion testing of coatings on metal substrates using a fixed-alignment adhesion tester. In addition to the dry film thickness measurement and wet sponge testing, other tests such as lightly tapping, scraping or cleaning of the degraded area allow a qualified inspector and design engineering the ability to determine the extent of peeling, delamination and blistering degradation to ensure that downstream flow blockage and tank integrity concerns are not an issue. Ultrasonic thickness measurement of the tank in the area of degraded coating ensures the tank thickness is sufficient to perform its pressure boundary function.

The following enhancement has been added to the Fire Water System Program:

Revise Fire Water System Program procedures to determine the condition of the coating on the interior of the fire water tanks by using one or more of the following methods when conditions such as cracking, peeling, blisters, delamination, rust or flaking are identified during visual examination:

1. Lightly tapping and scraping the coating to determine the coating integrity.
2. Wet-sponge testing or dry film testing to identify holidays in the coating.
3. Adhesion testing in accordance with ASTM D 3359, ASTM D4541, or equivalent.
4. Ultrasonic testing to determine if the tank thickness meets the minimum thickness criteria.

RAI-3.0.3-1-FWS-8

Background

As amended by letter dated May 13, 2014, LRA Section B.1.21 states an enhancement to the “acceptance criteria” program element of the Fire Water System program. The enhancement states the acceptance criteria for coatings as, “(1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface”

On November 14, 2014, the staff published AMP XI.M42 as part of LR-ISG-2013-01 “Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers, and Tanks.” The “acceptance criteria” program element of AMP XI.M42 included additional acceptance criteria for flaking, rusting, wall thickness measurements, adhesion test results, the acceptable size of blisters, and for changes in size or frequency of occurrence of blisters.

Issue

The staff cannot complete its evaluation of the acceptance criteria associated with internal coatings on the fire water storage tank without additional acceptance criteria associated with the above indications.

Request

Provide additional acceptance criteria for flaking, rusting, wall thickness measurements, adhesion test results, size of blisters, and for changes in size or frequency of occurrence of blisters.

RAI-3.0.3-1-FWS-8 Response

The acceptance criteria for LRA B.1.21 Fire Water System Program associated with internal coatings on the fire water storage tank will be revised to reflect the guidance of NUREG-1801 XI.M42 as set forth in LR-ISG-2013-01.

RAI 3.0.3-2b

Background

The response to RAI 3.0.3-2a Request (4) dated November 6, 2014, stated that “[i]n the event peeling, delamination, cracking, or loss of adhesion is identified, follow-up evaluations such as [emphasis added by staff] an adhesion test will be performed.” The response also stated that in the event that base metal is exposed, “[i]f repair or replacement of the coating is postponed, the evaluation will consider the minimum wall thickness requirements and the rate of corrosion and confirm the component remains acceptable for continued service until the next inspection or repair opportunity.”

In addition, the applicant revised the Fire Water System Program to state that dry film thickness readings, spot wet sponge tests, and ultrasonic thickness readings would be conducted where pitting or corrosion is detected in the fire water storage tank walls or floor.

Issue

On November 14, 2014, the staff published AMP XI.M42 as part of LR-ISG-2013-01 “Aging Management of Loss of Coating or Lining Integrity for Internal Coatings/Linings on In-Scope Piping, Piping Components, Heat Exchangers, and Tanks.” AMP XI.M42 recommends that adhesion testing should be conducted in order to evaluate degraded coatings. The response to RAI 3.0.3-2a Request (4) dated November 6, 2014, states that followup evaluations “such as” adhesion testing will be performed. The response did not state what alternatives to adhesion testing would be conducted in order to evaluate degraded coatings. The “corrective actions” program element of AMP XI.M42 recommends that coatings that do not meet acceptance criteria are repaired, replaced, or removed. The “acceptance criteria” program element of AMP XI.M42 states that indications of peeling and delamination are not acceptable. The response did not state how downstream flow blockage will be addressed when degraded coatings that do not meet acceptance criteria are returned to service and what actions would be taken if degraded coatings exhibiting peeling or delamination are returned to service without correction.

Request

State: (a) what alternatives to adhesion testing will be conducted to evaluate degraded coatings; (b) how potential downstream flow blockage due to degraded coatings that do not meet acceptance criteria will be evaluated prior to returning a degraded coating to service; and (c) what actions would be taken if degraded coatings exhibiting peeling or delamination are returned to service without correction.

RAI 3.0.3-2b Response

- a) An alternative to adhesion testing is used only in the case of a coating with a few blisters that are completely surrounded by sound coating bonded to the substrate. In this limited case, a visual inspection performed by a qualified coating inspector is performed. If delamination or peeling were found, the tank would be returned to service only if:
1. The delaminated or peeling coating was removed,
 2. The exposed underlying coating was verified to be securely bonded to the substrate as determined by an adhesion test, and
 3. The outermost coating was feathered and the remaining outermost coating was determined to be securely bonded to the coating below via an adhesion test.
- (b) A degraded coating/lining will be evaluated for potential flow blockage downstream prior to returning a coated component to service. Any coating that is found degraded and returned to service prior to repair or replacements will be evaluated by a coating specialist qualified in accordance with ASTM International standards endorsed in RG 1.54. The evaluation considers the effect of the coating/lining failure on the component's intended function, problems identified during prior inspections, repair methods used during prior repairs and known service history of the original coating.
- (c) If a coated/lined component is returned to service with degraded coating, an evaluation is performed to ensure blockage of downstream components is not a concern. In addition, as part of the corrective action program evaluation for returning a component to service with degraded coating, contingency plans are established. For example, operators and system engineers should have an increased awareness of possible higher strainer differential pressures, reduction of heat transfer, or reduction of flow during operator and system engineer system monitoring.

Attachment 2 to
GNRO-2015/00034
Changes to License Renewal Application

RAI 3.0.3-1-FWS-1a

LRA Section A.1.21 with additions underlined:

- Revise Fire Water System Program procedures to perform a flow blockage evaluation if during main drain testing, the flowing pressure drops more than 10 percent from the flowing pressure observed during the original acceptance test or other previously performed tests at the same location.

LRA Section B.1.21 with additions underlined:

4.Detection of Aging Effects	Revise Fire Water System Program procedures to perform a flow blockage evaluation if during main drain testing, the flowing pressure drops more than 10 percent from the <u>flowing pressure observed during the original acceptance test or other previously performed tests</u> at the same location.
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LRA Section A.4 with additions underlined:

<u>ITEM NUMBER</u>	<u>COMMITMENT</u>	<u>LRA SECTION</u>	<u>IMPLEMENTATION SCHEDULE</u>	<u>SOURCE</u>
12	Revise Fire Water System Program procedures to perform a flow blockage evaluation if during main drain testing, the flowing pressure drops more than 10 percent from the <u>flowing pressure observed during the original acceptance test or other previously performed tests</u> at the same location.	B.1.21	Prior to May 1, 2024 or the end of the last refueling outage prior to November 1, 2024, whichever is later.	GNRO-2011/0093 GNRO-2014/0030 GNRO-2014/0076 GNRO-2015/0034

RAI 3.0.3-1-FWS-2a

LRA Section A.1.21 with additions underlined and deletions marked through:

- Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following.
 - Testing for possible voids beneath the tank
 - Inspection of the vortex breaker
 - Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following testing specified by Section 9.2.7 of NFPA-25 (2011 Edition) to determine the condition of the coating on the interior of the fire water tanks when conditions such as cracking, peeling, blisters, delamination, rust or flaking are identified during the visual examination in accordance with NFPA 25 (2011 Edition), Section 9.2.6.4 if a coating defect is identified.
 1. Lightly tapping and scraping the coating to determine the coating integrity.
 2. Wet-sponge testing or dry film testing to identify holidays in the coating.
 3. Adhesion testing in accordance with ASTM D 3359, ASTM D4541, or equivalent.
 4. Ultrasonic testing to determine if the tank wall thickness meets the minimum wall thickness criteria.
 - ~~Take dry film thickness measurements at random locations to determine the overall coating thickness as specified by NFPA-25 (2011 Edition) Section 9.2.7 item (2).~~
 - ~~Perform a spot wet-sponge test to detect pinholes, cracks, or other compromises in the coating when specified in NFPA-25 (2011 Edition) Section 9.2.7 item (3).~~
 - ~~Take nondestructive ultrasonic readings to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.7 item (4).~~
 - ~~Test the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.7 item (5).~~

RAI 3.0.3-1-FWS-2a

LRA Section B.1.21 with additions underlined and deletions marked through:

Elements Affected	Exceptions
4. Detection of Aging Effects	<p>6. During an inspection in accordance with NFPA 25 Section 9.2.6.4, NFPA 25 Section 9.2.7.1 specifies an evaluation of interior tank coatings in accordance with the adhesion test of ASTM D 3359, Standard Test Methods for Measuring Adhesion by Tape Test, generally referred to as the "cross-hatch test." When indications are identified in the fire water tank coating, GGNS performs holiday testing. In addition, GGNS performs ultrasonic thickness checks or mechanical measurements of any identified corroded areas. <u>Although coating degradation testing may consist of destructive adhesion testing as described in ASTM 3359, non-destructive adhesion testing is the preferred method. GGNS does not apply the cross-hatch test.</u></p>

<p><u>4.Detection of Aging Effects</u></p>	<p>o Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks to include the following testing specified by Section 9.2.7 of NFPA-25 (2011 Edition) <u>to determine the condition of the coating on the interior of the fire water tanks when conditions such as cracking, peeling, blisters, delamination, rust or flaking are identified during the visual examination in accordance with NFPA 25 (2011 Edition), Section 9.2.6.4 if a coating defect is identified.</u></p>
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	<ol style="list-style-type: none">1. <u>Lightly tapping and scraping the coating to determine the coating integrity.</u>2. <u>Wet-sponge testing or dry film testing to identify holidays in the coating.</u>3. <u>Adhesion testing in accordance with ASTM D 3359, ASTM D4541, or equivalent.</u>4. <u>Ultrasonic testing to determine if the tank wall thickness meets the minimum wall thickness criteria.</u>
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RAI 3.0.3-1-FWS-2a

LRA Section A.4 with additions underlined and deletions marked through:

ITEM NUMBER	COMMITMENT	LRA SECTION	IMPLEMENTATION SCHEDULE	SOURCE
12	<p>Revise Fire Water System Program procedures for inspecting the interior of the fire water tanks at the frequency specified by NFPA 25 Section 9.2.6.1.2 to include the following.</p> <ul style="list-style-type: none"> • Testing required by Section 9.2.7 of NFPA-25 (2011 Edition) if a coating defect is identified <u>during the visual examination in accordance with NFPA 25 (2011 Edition), Section 9.2.6.4.</u> <ol style="list-style-type: none"> 1. <u>Lightly tapping and scraping the coating to determine the coating integrity.</u> 2. <u>Wet-sponge testing or dry film testing to identify holidays in the coating.</u> 3. <u>Adhesion testing in accordance with ASTM D 3359, ASTM D4541, or equivalent.</u> 4. <u>Ultrasonic testing to determine if the tank wall thickness meets the minimum wall thickness criteria.</u> • Take dry film thickness measurements at random locations to determine the overall coating thickness when specified by NFPA-25 (2011 Edition) Section 9.2.7 Item (2). • Perform a spot wet-sponge test to detect pinholes, cracks, or other compromises in the coating when specified by NFPA-25 (2011 Edition) Section 9.2.7 Item (3). 	B.1.21	Prior to May 1, 2024 or the end of the last refueling outage prior to November 1, 2024, whichever is later.	<p>GNRO-2011/0093</p> <p><u>GNRO-2014/0030</u></p> <p><u>GNRO-2014/0076</u></p> <p><u>GNRO-2015/0034</u></p>

	<ul style="list-style-type: none">• Take nondestructive ultrasonic readings to evaluate the wall thickness where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.7 Item (4).• Test the tank bottom for metal loss or rust on the underside by use of ultrasonic testing where there is evidence of pitting or corrosion as specified by NFPA-25 (2011 Edition) Section 9.2.7 Item (5).			
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RAI-3.0.3-1-FWS-8

LRA Section A.1.21 with additions underlined and deletions marked through:

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

Acceptance criteria are as follows:

- a. Indications of peeling and delamination are not acceptable.
- b. Blisters are evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard. Blisters should be limited to a few intact small blisters that are completely surrounded by sound coating/lining bonded to the substrate. Blister size and frequency should not be increasing between inspections (e.g., reference ASTM D714-02, "Standard Test Method for Evaluating Degree of Blistering of Paints").
- c. Indications such as cracking, flaking, and rusting are to be evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard.
- d. Minor cracking and spalling of cementitious coatings/linings is acceptable provided there is no evidence that the coating/lining is debonding from the base material.
- e. As applicable, wall thickness measurements, projected to the next inspection, meet design minimum wall requirements.
- f. Adhesion testing results, when conducted, meet or exceed the degree of adhesion recommended in plant-specific design requirements specific to the coating/lining and substrate.

RAI-3.0.3-1-FWS-8

LRA Section B.1.21 with deletions marked through and additions underlined:

<p>6. Acceptance Criteria</p>	<p>Revise the Fire Water System Program procedures to include the following <u>add</u> acceptance criteria for loss of coating integrity: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. Coatings that do not meet the acceptance criteria will be repaired or replaced.</p> <p><u>a. Indications of peeling and delamination are not acceptable.</u></p> <p><u>b. Blisters are evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard. Blisters should be limited to a few intact small blisters that are completely surrounded by sound coating/lining bonded to the substrate. Blister size and frequency should not be increasing between inspections (e.g., reference ASTM D714-02, "Standard Test Method for Evaluating Degree of Blistering of Paints").</u></p> <p><u>c. Indications such as cracking, flaking, and rusting are to be evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard.</u></p> <p><u>d. Minor cracking and spalling of cementitious coatings/linings is acceptable provided there is no evidence that the coating/lining is debonding from the base material.</u></p> <p><u>e. As applicable, wall thickness measurements, projected to the next inspection, meet design minimum wall requirements.</u></p> <p><u>f. Adhesion testing results, when conducted, meet or exceed the degree of adhesion recommended in plant-specific design requirements specific to the coating/lining and</u></p>
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	<u>substrate.</u>
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RAI-3.0.3-1-FWS-8

LRA Section A.4 with deletions marked through and additions underlined:

<u>ITEM NUMBER</u>	<u>COMMITMENT</u>	<u>LRA SECTION</u>	<u>IMPLEMENTATION SCHEDULE</u>	<u>SOURCE</u>
12	<ul style="list-style-type: none"> • Revise the Fire Water System Program procedures to <u>add include the following acceptance criteria for loss of coating integrity: (1) peeling and delamination are not acceptable, (2) cracking is not acceptable if accompanied by delamination or loss of adhesion, and (3) blisters are limited to intact blisters that are completely surrounded by sound coating bonded to the surface. Coatings that do not meet the acceptance criteria will be repaired or replaced</u> <ol style="list-style-type: none"> a. <u>Indications of peeling and delamination are not acceptable.</u> b. <u>Blisters are evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard. Blisters should be limited to a few intact small blisters that are completely surrounded by sound coating/lining bonded to the substrate. Blister size and frequency should not be</u> 	B.1.21	Prior to May 1, 2024 or the end of the last refueling outage prior to November 1, 2024, whichever is later.	<p>GNRO-2011/0093</p> <p><u>GNRO-2014/0030</u></p> <p><u>GNRO-2014/0076</u></p> <p><u>GNRO-2015/0034</u></p>

	<p><u>increasing between inspections (e.g., reference ASTM D714-02, "Standard Test Method for Evaluating Degree of Blistering of Paints").</u></p> <p><u>c. Indications such as cracking, flaking, and rusting are to be evaluated by a coatings specialist qualified in accordance with an ASTM International standard endorsed in RG 1.54 including staff limitations associated with use of a particular standard.</u></p> <p><u>d. Minor cracking and spalling of cementitious coatings/linings is acceptable provided there is no evidence that the coating/lining is debonding from the base material.</u></p> <p><u>e. As applicable, wall thickness measurements, projected to the next inspection, meet design minimum wall requirements.</u></p> <p><u>f. Adhesion testing results, when conducted, meet or exceed the degree of adhesion recommended in plant-specific design requirements specific to the coating/lining and substrate.</u></p>		
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