

IPRenewal NPEmails

From: Wentzel, Michael
Sent: Tuesday, July 26, 2016 11:20 AM
To: Louie, Richard (rlouie@entergy.com)
Subject: RAI Set 2016-01
Attachments: Request for Additional Informatin for the Review of the Indian Point LRA, Set 2016-01 (ML16138A194).pdf

Rich,

As discussed, attached are the final RAIs.

Thanks,
Mike

Michael Wentzel
Project Manager
NRR/DLR/RERP
(301) 415-6459
michael.wentzel@nrc.gov

Hearing Identifier: IndianPointUnits2and3NonPublic_EX
Email Number: 7523

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Subject: RAI Set 2016-01
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From: Wentzel, Michael

Created By: Michael.Wentzel@nrc.gov

Recipients:
"Louie, Richard (rlouie@entergy.com)" <rlouie@entergy.com>
Tracking Status: None

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

July 25, 2016

Vice President, Operations
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
450 Broadway, GSB
P.O. Box 249
Buchanan, NY 10511-0249

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3, LICENSE
RENEWAL APPLICATION, SET 2016-01 (CAC NOS. MD5407 AND MD5408)

Dear Sir or Madam:

By letter dated April 23, 2007, as supplemented by letters dated May 3, 2007, and June 21, 2007, Entergy Nuclear Operations, Inc. (Entergy), submitted an application pursuant to Title 10 of the *Code of Federal Regulations* Part 54, to renew the operating licenses for Indian Point Nuclear Generating Unit Nos. 2 and 3, for review by the U.S. Nuclear Regulatory Commission (NRC). The NRC staff documented its findings in the Safety Evaluation Report (SER) related to the license renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3, which was issued August 11, 2009 and supplemented August 30, 2011 (SER Supplement 1), and November 6, 2014 (SER Supplement 2).

By letters dated December 16, 2014, and August 18, 2015, Entergy responded to the NRC staff's requests for additional information (RAIs) pertaining to LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation." Based on its review of the information contained in Entergy's letter, the NRC staff requests additional information as described in the enclosure. On February 23-25, 2016, the NRC staff conducted a supplemental regulatory audit to gain a better understanding of Entergy's responses to the RAIs. Based on its review of the information contained in Entergy's letters and at the audit, the NRC staff requests additional information as described in the enclosure.

This RAI was discussed with Mr. Richard Louie, and a mutually agreeable date for Entergy's response is within 90 days from the date of this letter.

- 2-

If you have any questions, please contact me at 301-415-6459, or by email at michael.wentzel@nrc.gov.

Sincerely,

/RA/

Michael Wentzel, Project Manager
Environmental Review and Projects Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

Enclosure:
As stated

cc w/encl: Listserv

If you have any questions, please contact me at 301-415-6459, or by email at michael.wentzel@nrc.gov.

Sincerely,

/RA/

Michael Wentzel, Project Manager
Environmental Review and Projects Branch
Division of License Renewal
Office of Nuclear Reactor Regulation

Docket Nos. 50-247 and 50-286

Enclosure:
As stated

cc: Listserv

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ADAMS Accession No.: ML16138A194

*concurring via email

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|---------------|---------|--------------|----------------|--------------|
| OFFICE | LA:DLR | PM: DLR/RERP | BC:DLR/RPB1 | PM: DLR/RERP |
| NAME | IBetts | MWentzel | YDiaz-Sanabria | MWentzel |
| DATE | 5/26/16 | 7/25/16 | 7/25/16 | 7/25/16 |

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SUBJECT: REQUEST FOR ADDITIONAL INFORMATION FOR THE REVIEW OF THE
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3, LICENSE
RENEWAL APPLICATION, SET 2016-01 (CAC NOS. MD5407 AND MD5408)

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REQUEST FOR ADDITIONAL INFORMATION, SET 2016-01
RELATED TO INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 AND 3
LICENSE RENEWAL APPLICATION
DOCKET NOS. 50-247 AND 50-286
REGARDING LR-ISG-2012-02

RAI 3.0.3-9

Background

By letter dated December 16, 2014 (ML14365A069), Entergy Nuclear Operations, Inc. (Entergy), stated the following:

- The Fire Water System Program includes volumetric wall thickness measurements used to ensure that wall thickness is within required structural limits. Entergy also stated that wall thickness measurements conducted for IP2 prior to the end of its original operating term did not identify any unacceptable wall thinning. Entergy also stated that, “[l]ocalized corrosion has resulted in minor through-wall leaks that have no impact on system performance and do not threaten the structural integrity of the piping or the safety function of nearby equipment.” Entergy did not propose any changes to its Fire Water System Program to address recurring internal corrosion (RIC).
- Loss of material in the city water system is managed by the Periodic Surveillance and Preventive Maintenance Program. Entergy also stated that, “[h]owever, based on past operating experience, they [through-wall leaks] do not compromise the intended functions of these or any other system, and do not warrant aging management program activities beyond those provided by established aging management programs and the corrective action program.” In its letter dated September 26, 2012 (ML12285A084), Entergy stated that visual inspection or other NDE techniques will be used to inspect a representative sample of the internals of city water piping, and piping components to manage loss of material. Entergy did not propose any changes to its Periodic Surveillance and Preventive Maintenance Program to address RIC.

It appears that two events have impacted the performance of the fire water system.

- IP2 – NRC Integrated Inspection Report 050000247/2003011 (ML033140584) documents a September 10, 2003, 80 gallon per minute leak that resulted in the fire water header not being available to perform its intended function for approximately three hours. The apparent cause for this leak states, “[t]he apparent cause for the pin-hole leak is age related corrosion degradation of the piping, specifically, high-oxygenation pitting corrosion. The piping is original Unit 1 equipment, schedule 40 un-lined black steel pipe that is approximately 45 years old. The follow-up UT inspections indicated that the corrosion mechanism that resulted in the pinhole was not general pipe corrosion but was localized in the pinhole. The periodic testing of the system introduces fresh oxygen to the system and such cyclic re-oxygenation results in pits caused by 'high-oxygenation corrosion.' These pits then grow to become thru wall pinhole leaks in the piping. Portions not subject to periodic flow are not subject to this corrosion mechanism.”
- IP2 – NRC Integrated Inspection Report 05000247/2015001 and 05000286/2015001 (ML15133A264) documents a December 29, 2014, failure of a 10-inch piping spool piece in the IP1 high pressure fire protection header that resulted in the fire water header

ENCLOSURE

to IP2 not being available to perform its intended function for about two hours. The failure was as a result of a crack opening up along the longitudinal seam weld along the bottom of the pipe. Three previously identified pinhole leaks were located along the length of the cracked region.

Issue

During the supplemental audit conducted on February 23-25, 2016, the U.S. Nuclear Regulatory Commission (NRC) staff reviewed a list of leaks in the fire water and city water systems provided by Entergy. These leaks encompassed those occurring from 2007 through 2015. During this timeframe, there were approximately 42 leaks in the fire water system and 14 in the city water system. Sixteen of the fire water leaks were inspected using ultrasonic thickness techniques. Ultrasonic inspections were conducted on an additional 14 locations at IP2. Based on Entergy's evaluation of all of the thickness measurements, structural integrity requirements were met. The NRC staff reviewed Entergy's analytical techniques. Entergy has generated a preventive maintenance activity to perform ultrasonic inspections at the additional 14 locations by 2023. The NRC staff reviewed the ultrasonic thickness reports for two of the leaks associated with the December 29, 2014 failure. The NRC staff projected potential loss of material based on corrosion rates documented in Entergy's calculations. It would appear that structural integrity requirements would have been met on the day of the failure. Based on its review of documents during the audit, the NRC staff concluded that conducting ultrasonic wall thickness examinations will not provide sufficient information to result in prevention of potential future losses of intended function of the fire water and city water system.

The cause evaluation for the September 10, 2003, failure did not provide an explanation as to why the pinhole leak, unlike the numerous other pinhole leaks, resulted in a temporary loss of intended function of the fire water header. Entergy does not have or did not provide an apparent cause report for the December 29, 2014 failure.

Lacking an apparent cause of the failure on December 29, 2014, and the limited causal analysis of the failure on September 10, 2003, the NRC staff lacks sufficient information to conclude that Entergy has implemented effective means to provide reasonable assurance that future losses of intended function of the fire water and city water system will not occur.

Request

- 1) State the cause of the failure on December 29, 2014. If possible, provide additional information related to the cause of the failure on September 10, 2003. In particular, if possible, provide information related to why the pinhole leak, unlike numerous other pinhole leaks, resulted in a temporary loss of intended function of the fire water header during the September 10, 2003, failure.
- 2) State how these causes of failure are related to age-related degradation.
- 3) Propose changes to aging management programs, as applicable, to address recurring internal corrosion in the fire water and city water systems or provide the basis as to why changes are not necessary.

RAI 3.0.3-10

Background

The NRC staff issued the Safety Evaluation Report (SER) for License Renewal of Indian Point Nuclear Generating Unit Nos. 2 and 3 (IP2 and IP3) in August 2009. As documented in the SER, the NRC staff concluded that the Service Water Integrity Program was shown to adequately manage the effects of aging. Since the completion of its initial reviews for the SER, as part of its efforts to evaluate information for interim staff guidance in LR-ISG-2012-02, "Aging Management of Internal Surfaces, Fire Water Systems, Atmospheric Storage Tanks, and Corrosion Under Insulation," the NRC staff identified operating experience at IP2 and IP3 during the intervening years (i.e., after 2009) where, as a result of aging effects, licensing basis functions may have been impacted by certain service water system components or components supported by the service water system. In addition, during its reviews of the more recent events, the NRC staff identified another historical event in 2002 that was not previously described. Based on this recently identified operating experience, the NRC staff needs additional information to evaluate the adequacy of Entergy's Service Water Integrity Program in addressing recurring internal corrosion.

Issue

- 1) Licensee Event Report (LER) 286/2002-001 documents corrosion in an 18-inch service water pipe where the remaining wall thickness did not provide sufficient structural integrity. The cement-lined pipe configuration did not appear to be unique, the prior visual inspections did not reveal any missing cement liner or biological growth that are precursors to corrosion of the pipe; however, the existing Generic Letter (GL) 89-13 program did not prevent a loss of pressure boundary due to a known degradation mechanism. It is unclear to the NRC staff that effective changes have been made to ensure that future, similar losses of pressure boundary will not occur in other cement-lined piping
- 2) LER 286/2011-003 documents corrosion in a 10-inch service water pipe involving a prior repair that caused a safety system functional failure due to flooding. Entergy's August 18, 2015, letter states that the through-wall failure of the piping was not considered to be due to the effects of aging because the loss of material occurred due to an inadequate repair of the concrete lining. It is unclear to the NRC staff that effective changes have been made to ensure that future, similar loss of intended function involving flooding or prior repairs will not occur in other cement-lined piping.
- 3) LER 247/2011-003 documents inoperable containment fan cooler units due to silt in the service water intake bay and notes that similar silt levels had caused similar issues in 2007. According to Entergy's August 2015 letter, the associated changes to the Service Water Integrity Program were not made to manage the effects of aging, but instead were made to manage the effects of weather-related events. In addition, as a separate action, Entergy changed its associated GL 89-13 program commitment, which potentially allows the service water intake bay silting inspections to be conducted less frequently than given in GL 89-13. Given the distinction made between age-related silting and event-driven silting, and the change to GL 89-13 commitment, it is unclear to the NRC staff that

effective changes have been made to ensure that the effects of aging associated with silting in the service water intake bay are adequately managed.

- 4) LER 247/2013-004 documents inoperable service water piping that rendered radiation monitors R-49, R-46, and R-53 non-functional, requiring compensatory action to be taken. The NRC staff identified four subsequent condition reports (CR-IP2-2013-5053, CR-IP2-2014-1179, CR-IP2-2014-6504, and CR-IP2-2015-3500) documenting additional leaks with the same consequence. The LER states that full piping replacement was planned for the 2014 refueling outage, and Entergy's August 2015 letter states that 200 feet of this piping was replaced in 2014. Given that leakage has occurred subsequent to the piping replacement, it is unclear to the NRC staff that effective changes have been made to the program to ensure that future, similar recurring leaks will not adversely impact the intended function(s) of the radiation monitors.
- 5) LER 286/2014-002 documents a leak in a socket welded service water pipe that resulted in an essential service water header being declared inoperable because the leak location did not meet the ASME Code Case N-513-3 criteria. The LER states that the service water piping and valve flush procedure, 3-PT-R185B, was specifically developed to address recurring leaks in stagnant vent and drain piping, and the procedure is the main barrier for preventing future leaks in carbon steel socket welded piping. In its August 2015 letter, Entergy states that a section was added to the Program governing procedure in July 2011, after Entergy identified that IP2 did not have an equivalent flushing procedure as IP3. Entergy also states that the IP3 flushing procedure has been effective since being instituted in 2001. It is unclear to the NRC staff that effective changes have been made to the program because the procedure for preventing leaks apparently does not prevent recurring leaks. It is also unclear whether a comprehensive review has been performed to identify other missing unit-specific procedures for managing the effects of aging.
- 6) The August 2015 response to RAI 3.0.3-4 states more than 600 weld examinations have been performed since 1997 with more than 90 percent of the welds meeting acceptance criteria. The approximately 10 percent of welds that did not meet acceptance criteria can be viewed as the program having prevented about 60 leaks over the span of 18 years. In contrast, the listing for the number of leaks in the response indicates there have been over 90 leaks that the program did not prevent in 11 years. Although Entergy has made efforts to manage the effects of aging associated with recurring leaks, it is unclear whether the significance (i.e., multiple instances of loss of intended function) of these leaks will be limited as ongoing corrosion occurs.
- 7) Entergy's December 2014 letter included an enhancement to the Service Water Integrity Program to evaluate through-wall leakage using the corrective action program. Although all conditions adverse to quality should be entered into the corrective action program and evaluated, given the need for this enhancement, it is unclear to the NRC staff whether previous leaks were evaluated under the corrective action program and, consequently, considered during previous operating experience reviews of corrective action documents. In addition, the basis for the December 31, 2019, completion date for this enhancement is unclear.

Request

- 1) Regarding the issues discussed above in LER 286/2002-001, provide information to show that changes made to the program (since that time) provide reasonable assurance that recurrence of the loss of function in other cement-lined piping is unlikely.
- 2) For LER 286/2011-003:
 - a) Provide the bases for reasonable assurance that the Service Water Integrity Program compensates for all past liner repairs such that this degradation mechanism will not result in a loss of intended function of the service water system. Also, provide the bases for reasonable assurance that all locations where flooding due to system leakage could cause loss of intended function have been identified and evaluated for probable leak rates.
 - b) For the previous operating experience reviews for license renewal, identify past degradation involving through-wall leakage that was not considered to be due to the effects of aging, and provide the bases to demonstrate that the cause of through-wall leakage has been adequately addressed to prevent a recurrence of a loss of safety function.
- 3) For LER 247/2011-003, clarify whether silt monitoring of the intake bays is included as an aging management activity. Provide the basis to demonstrate that the Service Water Integrity program, as modified by the December 2010 commitment changes, provides reasonable assurance that silting cannot result in a loss of intended function of the service water system.
- 4) For LER 247/2013-004, and subsequently issued condition reports CR-IP2-2013-5053, CR-IP2-2014-1179, CR-IP2-2014-6504, and CR-IP2-2015-3500:
 - a) Describe what aspects of the Service Water Integrity Program will provide reasonable assurance that the intended function of these in-scope components will not be lost during the period of extended operation.
 - b) Provide an explanation for the continuing non-functionality of the radiation monitoring system given that 200 feet of the associated piping was replaced in 2014.
- 5) As it pertains to LER 286/2014-002:
 - a) State the basis for why the current Service Water Piping and Valve Flush procedure will provide reasonable assurance that the intended function of the service water system will be met. Address the effectiveness of the procedure in mitigating the leaks that it is intended to prevent, and discuss the basis for not needing to change the procedure to address recurring leaks in stagnant vent and drain piping.
 - b) Provide the bases establishing reasonable assurance that there are no other missing unit-specific aging management procedures being credited in the Service Water Integrity Program.
- 6) For the specific recurring internal corrosion category of cement-lined piping, state the minimum number of augmented inspections that will be performed in response to any identified leakage associated with corrosion. If augmented inspections will not be

performed, provide an assessment based on observed corrosion rate ranges to provide reasonable assurance that structural integrity of the service water piping will be maintained throughout the period of extended operation.

- 7) For components managed by the Service Water Integrity Program:
 - a) List the past degradation due to through-wall leakage issues that have not been evaluated under the corrective action program. Within the list provide the date, description of the issue, the basis for why it was not addressed in the corrective action program, and whether the issue was considered during the development of the program elements of the Service Water Integrity Program.
 - b) Provide the basis to justify the December 31, 2019 implementation date of this enhancement.