UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
2100 RENAISSANCE BOULEVARD, SUITE 100
KING OF PRUSSIA, PA 19406-2713

February 7, 2019

EA-16-193

Mr. Anthony J. Vitale
Site Vice President
Entergy Nuclear Operations, Inc.
Indian Point Energy Center
450 Broadway, General Services Building
P.O. Box 249
Buchanan, NY 10511-0249

SUBJECT: INDIAN POINT NUCLEAR GENERATING – INTEGRATED INSPECTION REPORT 05000247/2018004 AND 05000286/2018004

Dear Mr. Vitale:

On December 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Indian Point Nuclear Generating (Indian Point), Units 2 and 3. On January 10, 2019, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

The NRC inspectors documented two findings of very low safety significance (Green) in this report. One finding involved a violation of NRC requirements; one finding did not involve a violation of NRC requirements. The NRC is treating the violation as a non-cited violation (NCV) consistent with Section 2.3.2.a of the Enforcement Policy.

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region I; the Director, Office of Enforcement; and the NRC Resident Inspector at Indian Point. In addition, if you disagree with the cross-cutting aspect assignment or the finding not associated with a regulatory requirement in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC, 20555-0001; with copies to the Regional Administrator, Region I, and the NRC Resident Inspector at Indian Point.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at http://www.nrc.gov/reading-rm/adams.html and the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Daniel L. Schroeder, Chief
Reactor Projects Branch 2
Division of Reactor Projects

Docket Numbers: 50-247 and 50-286
License Numbers: DPR-26 and DPR-64

Enclosure:
Inspection Report 05000247/2018004 and
05000286/2018004

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers:	50-247 and 50-286
License Numbers:	DPR-26 and DPR-64
Report Numbers:	05000247/2018004 and 05000286/2018004
Enterprise Identifier:	I-2018-004-0078
Licensee:	Entergy Nuclear Northeast (Entergy)
Facility:	Indian Point Nuclear Generating, Units 2 and 3
Location:	450 Broadway, Generation Support Building Buchanan, NY 10511-0249
Inspection Dates:	October 1, 2018, to December 31, 2018
Inspectors:	B. Haagensen, Senior Resident Inspector A. Siwy, Resident Inspector J. Vazquez, Resident Inspector J. DeBoer, Emergency Preparedness Inspector T. Setzer, Senior Project Engineer D. Silk, Senior Operations Engineer S. Wilson, Health Physicist
Approved By:	Daniel L. Schroeder, Chief Reactor Projects Branch 2 Division of Reactor Projects

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring Entergy's performance at Indian Point Nuclear Generating, Units 2 and 3, by conducting the baseline inspections described in this report in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to https://www.nrc.gov/reactors/operating/oversight.html for more information. NRC-identified and self-revealed findings, violations, and additional items are summarized in the table below.

List of Findings and Violations

Inadequate Control of Transient Combustibles in the 480 Volt Electrical Switchgear Room			
Cornerstone	Significance	Cross-Cutting Aspect	Inspection Results Section
Mitigating Systems	Green Non-Cited Violation (NCV) 05000286/2018004-01 Closed	H.5 – Work Management	71111.05Q
The inspectors identified a Green NCV of Unit 3 Technical Specification (TS) 5.4.1 when Entergy did not take adequate measures to control transient combustibles in accordance with established procedures and thereby did not maintain in effect all provisions of the approved fire protection program, as described in the Unit 3 final safety analysis report. Specifically, on two separate occasions, Entergy did not ensure that transient combustibles were evaluated in accordance with established procedures and, as a result, they allowed combustible loading in the 480 volt emergency switchgear room to exceed limits established in the fire hazards analysis (FHA) of record.			

Failure to Adequately Manage Flow Accelerated Corrosion on a Reheat Steam Line Caused a Steam Leak and a Reactor Trip			
Cornerstone	Significance	Cross-Cutting Aspect	Inspection Results Section
Initiating Events	Green Finding (FIN) 05000286/2018004-02 Closed	None	71153
A self-revealed Green FIN was identified when Entergy did not adequately manage the degradation of the 36C feedwater heater (FWH) reheat steam lines, as required by EN-DC-315, "Flow Accelerated Corrosion Program." The failure resulted in a large steam leak in the Unit 3 turbine building, from the 36C FWH reheat steam line, which required tripping the reactor and shutting the main steam isolation valve (MSIVs) to isolate the leak for plant and personnel safety.			

Additional Tracking Items

Type	Issue number	Title	Report Section	Status
LER	05000286/2018-002-00	Manual Reactor Shutdown Due to Weld Leak on Safety Injection System Tank	71153	Closed
LER	05000286/2018-003-00	Manual Reactor Trip Due to a Steam Leak on a High Pressure Feedwater Heater	71153	Closed
VIO	05000247/2016-003-07	Inadequate Control of Floor Drains to Minimize Groundwater Contamination (Enforcement Action (EA)-16-193)	71152	Closed

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PLANT STATUS

Unit 2 began the inspection period at rated thermal power. On October 29, 2018, operators reduced reactor power to 80 percent for turbine valve testing, followed by repairs to the 23 condensate pump. Operators returned the unit to rated thermal power on November 1, 2018, and it remained at or near rated thermal power for the remainder of the inspection period.

Unit 3 operated at or near rated thermal power for the entire inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program – Operations Phase." The inspectors performed plant status activities described in IMC 2515, Appendix D, "Plant Status," and conducted routine reviews using IP 71152, "Problem Identification and Resolution." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess Entergy's performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.01 - Adverse Weather Protection

Seasonal Extreme Weather (1 Sample)

The inspectors evaluated winter readiness of the Unit 2 service water system and the Unit 3 refueling water storage tank on December 20, 2018.

External Flooding (1 Sample)

The inspectors evaluated readiness to cope with external flooding at Units 2 and 3 on December 11, 2018.

71111.04 - Equipment Alignment

Partial Walkdowns (4 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

Unit 2

(1) Control room control panels with temporary scaffolding in place on October 22, 2018
(2) FWH and moisture separator reheat systems on October 26, 2018
(3) Service water following repair of valve SWN-6 on October 28, 2018

Unit 3

(4) 31 service water system on December 11, 2018

Complete Walkdowns (2 Samples)

(1) The inspectors evaluated system configurations during a complete walkdown of the Unit 3 480 volt analog current distribution system on November 10, 2018.
(2) The inspectors evaluated system configurations during a complete walkdown of the Unit 3 safety injection system on December 14 and 17, 2018.

71111.05A/Q - Fire Protection Annual/Quarterly

Quarterly Inspection (4 Samples)

The inspectors evaluated fire protection program implementation in the following selected areas:

Unit 2

(1) Transformer yard (pre-fire plan (PFP)-263) on December 13, 2018

Unit 3

(2) 480 volt switchgear room (PFP-351) on October 1, 2018
(3) Cable spreading room (PFP-352) on October 25, 2018
(4) Turbine building, 15-foot elevation (PFP-362), on November 12, 2018

71111.06 - Flood Protection Measures

Internal Flooding (1 Sample)

The inspectors evaluated internal flooding mitigation protections in:

(1) Emergency diesel generator (EDG) room at Unit 2 on December 19, 2018

71111.11 - Licensed Operator Requalification Program and Licensed Operator Performance

Operator Requalification (3 Samples)

Unit 2

(1) The inspectors observed and evaluated an operator requalification exam on October 2, 2018.
(2) The inspectors observed and evaluated a crew of licensed operators in the plant's simulator during licensed operator requalification training on November 27, 2018.

Unit 3

(3) The inspectors observed and evaluated a crew of licensed operators in the plant's simulator during an emergency planning training drill on December 12, 2018.

Operator Performance (1 Sample)

Unit 3

(1) The inspectors observed and evaluated an operator support of surveillance testing on October 3, 2018.

71111.11A – Licensed Operator Requalification Program and Licensed Operator Performance (Annual)

Operator Requalification Exam Results (Annual) (2 Samples)

(1) The inspectors reviewed and evaluated requalification examination results for Unit 2 (operating test only) on November 21, 2018.
(2) The inspectors reviewed and evaluated requalification examination results for Unit 3 (written and operating test) on November 21, 2018.

71111.11B – Licensed Operator Requalification Program and Licensed Operator Performance (Biennial)

Operator Requalification Program and Operator Performance (Biennial) (1 Sample)

The inspectors reviewed and evaluated operator performance, evaluator performance, and simulator performance during the Unit 2 requalification examinations completed on October 18, 2018.

71111.12 - Maintenance Effectiveness

Routine Maintenance Effectiveness (1 Sample)

The inspectors evaluated the effectiveness of routine maintenance activities associated with the following equipment and/or safety significant functions:

(1) 6.9 kV system at Units 2 and 3 on December 10, 2018

Quality Control (1 Sample)

The inspectors evaluated the following maintenance and quality control activities:

(1) Quality control program for commercial dedication of repair parts at Units 2 and 3 on December 20, 2018

71111.13 - Maintenance Risk Assessments and Emergent Work Control (4 Samples)

The inspectors evaluated the risk assessments for the following planned and emergent work activities:

Unit 2

(1) Planned Yellow risk during 21 motor-driven auxiliary feedwater pump maintenance activities on October 15, 2018
(2) Planned Yellow risk for restoration of offsite electrical power feeder 13W93 on December 17, 2018

Unit 3

(3) Elevated risk during 32 EDG maintenance window on October 29, 2018
(4) Planned Yellow risk for the 33 EDG 12-year overhaul on December 5, 2018

71111.15 - Operability Determinations and Functionality Assessments (3 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

Unit 2

(1) 23 fuel oil transfer pump failed motor condition assessment testing resulting in 23 EDG being declared inoperable (CR-IP2-2018-05597) on October 10, 2018

Unit 3

(2) Through-wall leak on service water discharge line SWN-49-1 to the 31 component cooling water heat exchanger (CR-IP3-2018-03011) on October 5, 2018
(3) Through-wall leak on service water temperature indicating line TI-1237 downstream of SWN-35-2 from the 32 component cooling water heat exchanger (CR-IP3-2018-03023) on October 8, 2018

71111.18 - Plant Modifications (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

(1) Engineering Change (EC) Package 79544 – Flow accelerated corrosion extent of condition and reheat steam system line repairs (permanent modification) at Unit 3 on September 23, 2018
(2) EC Package 79929 – Bypass nitrogen supply valve 891C to allow manual pressurization of the 33 accumulator (temporary modification) at Unit 3 on October 25, 2018

71111.19 - Post Maintenance Testing (3 Samples)

The inspectors evaluated post maintenance testing for the following maintenance/repair activities:

Unit 2

(1) 22 EDG after repairs on December 12, 2018

Unit 3

(2) 31 EDG post maintenance testing following 4-year engine maintenance and inspection on October 2, 2018
(3) Service water post maintenance testing following repair of leak on valve SWN-77-4 on October 31, 2018

71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

Routine (2 Samples)

(1) 2-PT-M048, 480 volt undervoltage alarm at Unit 2 on December 13, 2018
(2) 3-PC-OL27H, Electrical bus 6A 480 volt undervoltage relays inspection and calibration at Unit 3 on December 18, 2018

71114.04 - Emergency Action Level and Emergency Plan Changes (1 Sample)

The inspectors verified that the changes made to the emergency plan were done in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50.54(q)(3), and any change made to the Emergency Action Levels, Emergency Plan, and its lower-tier implementing procedures had not resulted in any reduction in effectiveness of the Plan. This evaluation does not constitute NRC approval.

71114.06 - Drill Evaluation

Emergency Planning Drill (1 Sample)

The inspectors evaluated the conduct of a routine Entergy emergency drill, including a hazardous environment in the cable spreading room (Alert declaration), the closure of an MSIV at 100 percent power with failure of the reactor protective system (Site Area Emergency declaration), and a loss of coolant accident into containment with fuel failure and potential failure of containment (General Emergency declaration) at Unit 3 on December 12, 2018. This drill also involved the activation of the alternate Emergency Operations Facility in Fishkill, New York.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

Mitigating Systems Performance Index (2 Samples)

The inspectors verified Entergy's performance indicators submittals listed below for the period from October 1, 2017, through September 30, 2018:

Unit 2

(1) Safety System Functional Failures (MS05)

Unit 3

(2) Safety System Functional Failures (MS05)

Operational Exposure Control Effectiveness (1 Sample)

The inspectors reviewed Entergy's submittals for the occupational radiological occurrences performance indicator for the period from October 1, 2017, through September 30, 2018.

Radiological Effluent TS/Offsite Dose Calculation Manual Radiological Effluent Occurrences (1 Sample)

The inspectors reviewed Entergy's submittals for the radiological effluent TS/Offsite Dose Calculation Manual radiological effluent occurrence performance indicator for the period from October 1, 2017, through September 30, 2018.

71152 - Problem Identification and Resolution

Semiannual Trend Review (1 Sample)

The inspectors reviewed Entergy's corrective action program for trends that might be indicative of a more significant safety issue.

Annual Follow-Up of Selected Issues (4 Samples)

The inspectors reviewed Entergy's implementation of its corrective action program related to the following issues:

(1) Service water integrity corrective actions for leaks in American Society of Mechanical Engineers (ASME) Class III systems at Units 2 and 3
(2) Corrective action effectiveness for pressurizer level channel L-461 at Unit 2
(3) Follow-up of cyber security Technical Instruction 2201/004 at Units 2 and 3 (Official Use Only – Security Related Information, Indian Point Nuclear Generating Units 2 and 3 – Temporary Instruction 2201/004, "Inspection of Implementation of Interim Cyber Security Milestones 1-7," Reports 05000247/2015405 and 05000286/2015405 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15295A050)) is documented in Official Use Only – Security Related Information, Indian Point Energy

Center, Units 2 and 3 – Security Inspection Report 05000247/2018410 and 05000286/2018410 (ADAMS Accession No. ML18341A038).

(4) Corrective actions for groundwater contamination at Unit 2

71153 - Follow-Up of Events and Notices of Enforcement Discretion

Events (2 Samples)

The inspectors evaluated response to the following events:

Unit 2

(1) Unplanned TS 3.0.3 entry and preparations for reactor downpower following failure of service water header cross-tie valve SWN-6 on October 28, 2018

Unit 3

(2) Fire and loss of qualified source of offsite power GT/2F breaker and bus on October 12, 2018.

Licensee Event Reports (LERs) (2 Samples)

The inspectors evaluated the following LERs, which can be accessed at https://lersearch.inl.gov/LERSearchCriteria.aspx:

(1) LER 05000286/2018-002-00, Manual Reactor Shutdown Due to Weld Leak on Safety Injection System Tank (ADAMS Accession No. ML18313A129)

The inspectors determined that it was not reasonable to foresee or correct the cause discussed in the LER; therefore, no performance deficiency was identified. The inspectors also concluded that no violation of NRC requirements occurred.

(2) LER 05000286/2018-003-00, Manual Reactor Trip Due to a Steam Leak on a High Pressure Feedwater Heater (ADAMS Accession No. ML18341A122)

The circumstances surrounding this LER are documented in the Inspection Results section, FIN 05000286/2018004-02.

INSPECTION RESULTS

Inadequate Control of Transient Combustibles in the 480 Volt Electrical Switchgear Room			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000286/2018004-01 Closed	H.5 – Work Management	71111.05Q
Introduction: The inspectors identified a Green NCV of Unit 3 TS 5.4.1 when Entergy did not take adequate measures to control transient combustibles in accordance with established procedures and thereby did not maintain in effect all provisions of the approved fire protection program, as described in the Unit 3 final safety analysis report. Specifically, on two separate			

occasions, Entergy did not ensure that transient combustibles were evaluated in accordance with established procedures; and as a result, they allowed combustible loading in the 480 volt emergency switchgear room to exceed limits established in the FHA of record.

Description: On August 28, 2018, the inspectors questioned the presence of scaffolding containing fire-retardant wooden planks, located in the 480 volt emergency switchgear room, and whether or not Entergy had developed an associated transient combustibles evaluation (TCE) in accordance with fleet procedure EN-DC-161, "Control of Combustibles." The switchgear room is classified by EN-DC-161 as a Level-2 plant area, and EN-DC-161 thereby requires that a TCE be processed when a job involves the introduction of more than 100 pounds of fire-retardant treated lumber. Entergy determined that the amount of lumber included in the scaffolding materials (an estimated 260 pounds) exceeded this 100-pound threshold, and they documented the issue in CR-IP3-2018-02527. Entergy then developed TCE 18-054, which concluded that the transient combustibles did not present a significant fire protection concern and that no special fire protection measures were required while materials were present. The scaffolding was left in place, as it was still to be used for ongoing work.

On October 1, 2018, while observing maintenance activities in the 31 EDG cell (located adjacent to the 480 volt switchgear room), the inspectors identified three 55-gallon drums (total of 165 gallons) of diesel generator lubrication oil (lube oil) being stored in the switchgear room, unattended. The inspectors questioned whether or not Entergy had developed an associated TCE. EN-DC-161 requires, for Level-2 plant areas, that a TCE be processed when a job involves the introduction of more than 5 gallons of combustible liquids in approved containers. Additionally, EN-DC-161 states that when lube oil is collected in drums outside of a designated storage area, the drums should be removed from the building or placed in an approved storage area either upon completion of shift following filling of the drum, or at the completion of the job, whichever comes first. The oil drums, however, had been filled and staged in the switchgear room during the previous shift. Entergy determined that TCE 18-061 had been developed for the work in the EDG cell, but that this TCE did not apply to the switchgear room, which was a separate fire zone. This issue was documented in CR-IP3-2018-02958, and Entergy then developed TCE 18-061, Revision 2, to address the staging of combustibles in the switchgear room. The evaluation concluded that the introduction of these combustibles would not adversely impact the fire protection program, nor would it challenge the conclusions of the FHA or the Appendix R safe-shutdown analysis because the oil contained in steel drums did not have a high potential for ignition, and the work being performed did not entail the introduction of additional ignition sources into the area. It was therefore concluded that no special fire protection or compensatory measures were required. The drums were removed during the following shift, after the associated maintenance activities were completed.

From TCE 18-061, the inspectors determined that the three 55-gallon drums of lube oil staged in the switchgear room introduced an estimated heat load of 6,744 BTU/ft^2. TCE 18-054 estimated that the wood scaffolding materials introduced a heat load of 1,581 BTU/ft^2. The Unit 3 FHA, as revised by EC-76353, established a maximum permissible combustible loading (loading limit) of 80,000 BTU/ft^2. The revised FHA also listed a fixed loading in the switchgear room (from permanently-staged permanently equipment) of 79,545 BTU/ft^2. The inspectors thereby concluded that, in the case of the wood scaffolding being present in the switchgear room, the total heat load (fixed plus transient) was estimated to be 1,126 BTU/ft^2 in excess of the FHA loading limit. In the case of the wood scaffolding plus the oil drums, the total heat load was estimated to be 7,870 BTU/ft^2 in excess of the FHA loading limit.

The oil drums were immediately removed from the switchgear room. The wood scaffolding planks, however, remained in the switchgear room, as they were to be used for ongoing work. The continued presence of a combustible loading in excess of the established loading limit for the room was documented in CR-IP3-2018-03633. To resolve the outstanding discrepancy, Entergy reviewed associated analyses and concluded that an excessive degree of conservatism was built into the 80,000-BTU/ft^2 limit. Prior to the development of EC-76353, the loading limit had been established to be 120,000 BTU/ft^2, based on the assumption that all fire barriers enclosing the room could withstand a fire lasting up to 1½ hours. However, this assumption had been brought into question during a 2017 NRC inspection, which identified that the dimensions of a damper assembly in the room slightly exceeded the acceptable dimensions for credited 1½-hour fire barrier. The loading limit for the room was thereafter reduced to 80,000 BTU/ft^2 to account for a more conservative assumption that the fire barriers could withstand a fire of at least one hour, as documented in IP3-ANAL-FP-0132, "Fire Damper Assembly Analysis." In reviewing the case of wood scaffolding staged in the room, Entergy concluded that, based on the conservatism built into the reduced limit, the introduction of an excess loading of 1,126 BTU/ft^2 (which would equate to approximately 0.8 minutes of additional potential fire severity) would not pose a significant concern. On November 19, 2018, TCE 18-054, Revision 1, was developed documenting this conclusion and providing justification for the continued staging of the scaffolding in the room. Subsequently, on November 29, 2018, Entergy implemented EC 80670, which established a new loading limit of 100,000 BTU/ft^2. This increased limit reflected the engineering judgment that the dampers were of a structural configuration that could contain a fire lasting nearly 1½ hours and that a limit of 100,000 BTU/ft^2 would provide an adequate degree of conservatism, while allowing for the conduct of activities in the room that introduce an acceptable amount of transient combustibles. The NRC inspectors reviewed the associated assessment and agreed that this conclusion was reasonable.

Corrective Actions: Regarding the wood scaffolding stored in the switchgear room without an associated TCE in place, Entergy generated CR-IP3-2018-02527, developed TCE 18-054, and thereafter revised TCE 18-054 to justify the continued presence of the scaffolding despite the fact that it constituted a combustible loading in excess of the loading limit listed in the FHA of record. Regarding the case of the lube oil drums, Entergy generated CR-IP3-2018-02958, revised TCE 18-061 to incorporate the switchgear room into the evaluation, and removed the oil drums after the associated maintenance activities were completed.

Corrective Action References: CR-IP3-2018-02527, CR-IP3-2018-02958, and CR-IP3-2018-03633

Performance Assessment:

Performance Deficiency: The inspectors determined that not completing a TCE, as required by EN-DC-161, "Control of Combustibles," Revision 18, was a performance deficiency, given that it was reasonably within Entergy's ability to foresee and correct and should have been prevented. Specifically, on August 28, 2018, wood in excess of 100 pounds was identified in the switchgear room; however, an associated TCE had not been developed. Additionally, on October 1, 2018, three 55-gallon drums of EDG lube oil were stored in the switchgear room without an associated TCE having been developed to authorize storage in this room, as required for a volume of lube oil in excess of 5 gallons.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with protection against external factors attribute of the Mitigating Systems cornerstone, and it adversely affected the cornerstone goal of ensuring the

availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, storage of combustibles in excess of the maximum permissible combustibles loading could have the potential to challenge the capability of fire barriers to prevent a fire from affecting multiple fire zones and further degrading plant equipment. Additionally, this issue was similar to an example listed in IMC 0612, Appendix E, "Examples of Minor Issues," Example 4.k., because the fire loading was not within the FHA limits established at the time. Entergy required the issuance of a revised evaluation to provide reasonable assurance that the presence of combustibles of a quantity in excess of the loading limit of record would not challenge the capacity of fire barriers, and further evaluation and the issuance of an EC was necessary to raise the established loading limit to a less-conservative value.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Appendix F, “Fire Protection Significance Determination Process,” and determined that this finding screened to Green (very low safety significance) because it had a low degradation rating in accordance with Attachment 2 of the appendix.

Cross-Cutting Aspect: The inspectors determined that this finding had a cross-cutting aspect in the area of Human Performance, Work Management, because Entergy did not adequately plan, control, and execute work activities such that nuclear safety was the overriding priority, nor did they adequately identify risk associated with work being performed or coordinate across working groups to anticipate and manage this risk. Specifically, in the case of wood scaffolding being stored in the switchgear room, while planning work to be performed, Entergy did not adequately consider the fire risk that would be introduced by the presence of additional combustible materials. In the case of lube oil being stored in the room, Entergy did not take adequate action to ensure that activities were executed in a manner that would prevent work taking place in one area (the adjacent EDG cell) from introducing additional fire risk into a space for which it had not been evaluated (the switchgear room). In both cases, Entergy did not take sufficient action to ensure that workers were aware of the fire protection requirements associated with activities being conducted and to ensure that they coordinated as needed across working groups to adequately assess and mitigate the associated fire risk.

Enforcement:

Violation: Unit 3 TS 5.4.1 states, in part, that written procedures shall be established and implemented covering fire protection program implementation. Entergy procedure EN-DC-161, “Control of Combustibles,” is the controlling document for the control of transient combustible materials within the fire protection program. EN-DC-161, Revision 18, requires, in part, that a TCE be processed if non-exempt combustible materials associated with a job in a Level 2 area include an excess of either 100 pounds of fire retardant treated lumber or 5 gallons of combustible liquids in approved containers.

Contrary to the above, on August 28, 2018, and October 1, 2018, Entergy did not process a TCE associated with storage of non-exempt combustible materials in excess of the limits listed in EN-DC-161 for a Level 2 area. Specifically, Entergy stored greater than 100 pounds of fire-retardant treated lumber and greater than 5 gallons of diesel generator lube oil in the 480 volt essential switchgear room without processing an associated TCE. Furthermore, from August 28, 2018, to November 29, 2018, Entergy allowed the total combustibles loading in the room to exceed the limit established in the FHA, as modified by EC 76353.

Disposition: This violation is being treated as an NCV, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Adequately Manage Flow Accelerated Corrosion on a Reheat Steam Line Caused a Steam Leak and a Reactor Trip			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000286/2018004-02 Closed	None	71153

Introduction: A self-revealed Green finding (FIN) was identified when Entergy did not adequately manage the degradation of the 36C FWH reheat steam lines, as required by EN-DC-315, "Flow Accelerated Corrosion Program." The failure resulted in a large steam leak in the Unit 3 turbine building from the 36C FWH reheat steam line, which required tripping the reactor and shutting the MSIVs to isolate the leak for plant and personnel safety.

Description: On September 18, 2018, Entergy identified a small steam leak on the 36C FWH reheat steam line. Over the period of approximately one hour, this steam leak increased in size until a decision was made to evacuate the turbine building, trip the reactor, and shut the MSIVs to stop the steam leak. Attempts to isolate the leak locally were unsuccessful. The event was promptly reported to the NRC (Manual Reactor Trip Due to a Steam Leak on a High Pressure Feedwater Heater, Event Number 53611) under 10 CFR 50.72(b)(2)(iv)(B), Valid Reactor Protective System Actuation, 10 CFR 50.72(b)(3)(iv)(A), Valid Safety System Actuation, and LER 05000286/2018-003-00, Manual Reactor Trip Due to Steam Leak on High Pressure Feedwater Heater (ADAMS Accession No. ML18341A122).

Entergy had adopted the industry standard software program, CHECWORKs™, to monitor and predict the effects of flow-accelerated corrosion (FAC) in susceptible piping systems, including the high pressure FWH reheat steam system. Entergy follows the requirements specified in EN-DC-315 by invoking the guidelines contained in reference 9 of the procedure (Electric Power Research Institute (EPRI), Nuclear Safety Analysis Center 202L, "Recommendations for an Effective Flow Accelerated Corrosion Program") and in reference 18 (EPRI, Technical Report 1019176, "CHECWORKS™ Steam Feedwater Application, Guidelines for Plant Modeling, and Evaluation of Components," dated November 2009), along with other industry guidelines. The objective of the FAC program is to predict, detect, monitor, and minimize degradation of single and two-phase flow piping (safety- and non-safety-related systems) to prevent failures while enhancing plant safety and reliability.

FAC occurs when a normally protective oxide layer on a metal surface dissolves in fast flowing water or wet steam. The underlying metal corrodes to recreate the oxide, and the metal loss continues. The rate of FAC degradation depends on the flow velocity, fluid temperature, chemistry, and other system-related parameters. FAC only affects carbon steel piping carrying ultra-pure, deoxygenated water, or wet steam. CHECWORKs™ is used by the industry to determine which system components are most susceptible to FAC, predict the wear rate of these components, and identify when the components need to be repaired or replaced prior to experiencing component failure. However, the components must be properly modeled in CHECWORKs™, and the program must be calibrated by measuring various representative wear rates on the components and inputting the inspection data into the CHECWORKs™ program. Wear rate modeling in CHECWORKs™ is based on realistic models, not conservative models. The program predicts a median wear rate, which implies that 50 percent of the components modeled will have higher wear rates than the model predicts. As a result, the assessment of component susceptibility depends heavily on the

accuracy of the modeling, the calibration of the model by inputting actual inspection data, and the conservative selection of criteria for monitoring susceptible components.

Previously, in 2007, the 36C FWH reheat steam line experienced erosion failure at a different component location/line section, and this failure was also not predicted by the CHECWORKS™ model. The size of this failure was small, and the steam leak was isolated without impacting plant performance. Entergy did not reassess the predictive validity of the model for this line following the 2007 failure. The inspectors concluded that this event represented an opportunity to revise the model to reflect the new information that the 36C FWH reheat steam line was experiencing greater FAC wear rates than either the 36A and 36B lines and to adjust the model to better predict the actual FAC wear rates in the 36C FWH reheat steam line. Had this change been made in accordance with program direction, the subsequent failure could have been predicted and thereby prevented. However, the failed line was repaired, extent of condition assessment was limited, and no further action was taken to modify the CHECWORKS™ model. The high pressure FWH reheat steam lines were modeled in CHECWORKS™ by a single reheat steam line that was supposed to be representative of all three reheat steam lines into the 36A, 36B, and 36C FWHs. This model is appropriate only if the wear rates on the three lines are the same. However, it was clear from the 2007 failure that the wear rate on the 36C FWH reheat steam line was more aggressive than the other lines, and the FAC wear rates could not be accurately represented by a single line in the CHECWORKS™ model. The inspectors concluded that this steam line failure should have resulted in Entergy expanding the scope for FAC inspections during the 2009 refueling outage, but the opportunity to do so was missed.

Entergy subsequently completed a root cause evaluation for the 2018 reheat steam line failure in November of 2018. The root cause evaluation concluded that the cause of the failure was that the FAC engineers did not use the system operating experience and replacement history to identify that reheat steam line piping to the 36C FWH was more susceptible to FAC than the same reheat steam piping to the 36A and 36B FWHs. Entergy identified that failures had occurred in 2007 on the 36C FWH reheat steam line branch. As a result, additional inspections should have been performed on the 36C FWH reheat steam line compared to the 36A and 36B lines because the 36C FWH reheat steam line was more susceptible to FAC. Entergy concluded that this action should have identified the wall thinning prior to failure. Also contributing to the failure was a weakness in the setup of the CHECWORKs™ model whereby the three parallel lines to the 36A, 36B, and 33C FWHs were modeled as a single representative line when the reality was that the actual FAC wear rates were different on each line. Another contributing cause was that the extent of condition guidance for scope expansion in EN-DC-315 was limited to “components within two diameters downstream” which did not include the elbow in the line that subsequently failed. The inspectors independently reviewed the root cause evaluation and concluded that Entergy had adequately identified the proximate cause of the failure.

The reheat steam lines to the high pressure FWHs are not classified as safety-related components and are therefore not subject to the requirements of the quality assurance program. However, they are subject to the requirements of Entergy’s internal procedures including EN-DC-315 and referenced documents. In addition, the renewed license for Unit 3 commits Entergy to managing age-related degradation of the 36C FWH reheat steam lines under the FAC program described in EN-DC-315.

Corrective Actions: Entergy replaced the failed section of the 36C FWH reheat steam line and completed an extent of condition assessment on all the reheat steam lines going into the

36C FWH. Entergy inspected approximately 43 additional component locations on the 36 FWH reheat steam lines and replaced several additional affected sections that had experienced substantial FAC erosion; greater than predicted by CHECWORKs™.

Corrective Action References: CR-IP3-2018-02773 and CR-HQN-2018-02056

Performance Assessment:

Performance Deficiency: The inspectors determined that failure to follow the requirements of EN-DC-315 and industry guidelines incorporated by reference was a performance deficiency that was within Entergy's ability to foresee and correct. Specifically, the 36C FWH reheat steam line was not conservatively modeled in the CHECWORKs™ software application program because Entergy did not follow the guidelines contained in reference 9 of the procedure (EPRI, Nuclear Safety Analysis Center 202L, "Recommendations for an Effective Flow Accelerated Corrosion Program") and reference 18 of the procedure (EPRI, Technical Report 1019176, "CHECWORKS™ Steam Feedwater Application, Guidelines for Plant Modeling and Evaluation of Components," dated November 2009). Specifically, Entergy did not update the FAC modeling of the high pressure FWH reheat steam lines in 2007 when a prior component failure occurred. In addition, Entergy modeled six parallel high pressure FWH reheat steam lines as a single representative line, contrary to the guidance in the program documents. This guidance states, *"It is recommended that parallel trains be divided into separate lines. This allows improved evaluation during model calibration."* The procedure further states, *"It is strongly recommended that all parallel trains of susceptible systems be fully modeled. This is because parallel trains are rarely identical."* Entergy did not recognize that the single-line model in CHECWORKs™ was not representative of the actual FAC wear rate in the 36C FWH reheat steam line, because the unique operating parameters in this line were more adverse than those parameters in the 36A and 36B FWH reheat steam lines. The inspectors therefore determined that while the performance deficiency was within Entergy's ability to foresee and prevent, it did not occur within the three-year period of current performance assessment.

Screening: Using IMC 0612, Appendix B, "Issue Screening," the inspectors determined the performance deficiency was more than minor because it was associated with the equipment performance attribute of the Initiating Events cornerstone and adversely affected the cornerstone objective to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure of the 36C FWH reheat steam line caused hazardous conditions in the turbine building, which required the operators to manually trip the reactor and shut the MSIVs.

Significance: The inspectors assessed the significance of the finding using IMC 0609, Attachment 4, "Initial Characterization of Findings," and determined that performance deficiency affected the Initiating Events cornerstone as a transient initiation contributor. Specifically, the failure of the reheat steam piping led to a reactor trip. Using IMC 0609, Appendix A, Exhibit 1, "Initiating Events Screening Questions," the inspectors determined that the finding screened to Green. Specifically, the reheat steam line break caused the operators to manually trip the reactor, but it did not also cause the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. Specifically, the auxiliary feedwater system started and responded as designed during a reactor trip.

Cross-Cutting Aspect: The inspectors did not assign a cross-cutting aspect for this issue because it was not indicative of current Entergy performance. The performance deficiency

occurred in 2007, when a prior failure occurred in the 36C FWH reheat steam line which should have caused Entergy to assess the predicative validity of the susceptibility modeling for this line in CHECWORKs™.
Enforcement: The inspectors did not identify a violation of regulatory requirements associated with this finding.

Observations	71152 Annual Follow-Up of Selected Issues

Service Water Integrity Corrective Actions for Leaks in ASME Class III Systems

The inspectors reviewed the effectiveness of the corrective actions associated with the resolution of the high incidence of through-wall leaks in ASME Class III service water system piping observed in 2015 and 2016. The ASME code does not permit plants to continue to operate indefinitely with through-wall leaks in ASME Class III piping. If a leak occurs, further analysis is required under the code to demonstrate structural integrity of the leaking pipe or component and system operability.

In 2015 and 2016, there was an increase in the frequency of through-wall leaks in service water pipes in both units which resulted in the generation of several LERs. This trend was assessed during a problem identification and resolution inspection sample at the end of 2016 by a specialized engineering inspector from the Division of Reactor Safety (Indian Point Integrated Inspection Report 05000247/2016004 and 05000286/2016004 (ADAMS Accession No. ML17037C541)). The inspectors determined that, in general, Entergy's overall response to the service water system piping leaks was commensurate with the safety significance and included appropriate compensatory actions. The inspectors concluded that completed and planned actions were reasonable to correct the service water system piping weld flaw leakage problems.

In 2018, the inspectors revisited this issue of concern to verify that the planned actions from 2016 had been completed and to assess their effectiveness. The inspectors concluded that the service water integrity improvement program had reduced the number of through-wall leaks from previous years. The service water leak database showed a substantial reduction in ASME Class III piping system through-wall leaks in 2017 and 2018. In 2015, there were nine through-wall leaks and in 2016 there were five through-wall leaks. The inspectors concluded that this reduction was primarily due to the effectiveness of corrective actions from Entergy's service water integrity improvement program including the replacement of degraded carbon steel radiation monitor piping with corrosion resistant stainless alloy (AL6xn) piping. The inspectors also noted one of Entergy's service water leak mitigation plans included the installation of mechanical seals over the unprotected weld joints on the inside diameter of the cement-lined carbon steel piping on service water header lines on Unit 2 to address the crevice corrosion initiated leaks. The inspectors reviewed Indian Point's Generic Letter 89-13 program and the service water pre-outage non-destructive examination inspection database to verify that Entergy was adequately tracking and prioritizing vulnerable service water piping locations and scheduling inspections on required pipe weld locations.

The inspectors noted that insulation kits had not been consistently installed between the new stainless steel AL6xn service water lines (primarily serving the radiation monitors) and the old carbon steel service water lines. This condition causes the establishment of a galvanic

corrosion cell at the interface between the dissimilar metals and may result in accelerated corrosion if the difference in the electrode potentials between carbon steel and stainless steel is high. However, to date, there has been no substantial degradation identified in these dissimilar metal joints. A license renewal commitment requires monitoring of dissimilar metal joints for potential future degradation.

In the late 1990s, Unit 3 completed a project to update the safety classifications for safety-related systems, structures, and components and conservatively reclassified all piping systems that were originally built under ASME Code B31.1 and seismic Class I requirements to ASME Code Class III. Subsequently, the inspectors also noted that service water lines that were formerly classified as ASME Code Class III and subject to comprehensive code-mandated inspections had been reclassified to ASME Code B31.1 because the original classification was later determined to be overly conservative.

Component cooling water heat exchanger line 405 was reclassified under EC 61654 primarily on the bases that a failure of the heat exchanger discharge line would not impede the safety function of the service water system and component cooling water heat exchangers because failure of line 405 would not restrict or reduce service water flow to the safety-related components (CR-HQN-2017-00416). The Unit 3 common service water discharge line from the outlet of the component cooling water heat exchangers had experienced corrosion that reduced the wall thickness of the piping below the required minimum wall thickness. The corrective action to restore structural integrity was to install a carbon fiber wrap around the pipe to restore structural integrity under EC 61654. However, the installation of carbon fiber wrap is not a code-approved repair and could not be used on ASME Class III pipe. Entergy subsequently declassified the corroded pipe from ASME Class III to ASME Class B31.1, seismic Class I, in order to meet the code requirements to install carbon fiber wrap on line 405. This issue of concern resulted in opening an unresolved item (URI) in Indian Point Integrated Inspection Report 05000247/2017004 and 05000286/2017004 (ADAMS Accession No. ML18045A497). The inspectors subsequently closed the URI after completing a comprehensive inspection, as documented in Indian Point Integrated Inspection Report 05000247/2018001 and 05000286/2018001 (ADAMS Accession No. ML18131A024) by a Division of Reactor Safety Engineering inspector.

In another case, on October 2, 2017, a through-wall leak was identified at FCV-1176A on the 10-inch common service water discharge line from all three Unit 2 EDGs (CR-IP2-2017-03616). The section of piping had been declassified from ASME Class III to ASME B31.1. The through-wall leak was located on a socket welded fitting for a drain line and could not be repaired under an approved ASME code case. The service water pipe component was classified under ASME B31.1, which then allowed the installation of a temporary housekeeping patch for a six-month period until the component could be weld-repaired during a 2018 outage.

In each case, the inspectors determined that the reclassification from ASME Code Class III to ASME Code B31.1 met the requirements under 10 CFR 50.59, “Changes, Tests, and Experiments,” and 10 CFR 50.55a, “Codes and Standards,” at the time of the reclassification. However, the inspectors noted that the inspection requirements for ASME B31.1 (seismic Class I) piping to maintain piping integrity are not well-specified as they were under the ASME Class III Code. The catastrophic failure of the component cooling water heat exchanger discharge pipe could potentially result in the flooding of portions at the Unit 3 auxiliary building and failure of associated safety significant equipment in the nearby area. The failure of the

common service water discharge line from the Unit 2 EDGs could flood the common EDG sump, which could compromise the operability of all three EDGs.

Observations	71152 Annual Follow-Up of Selected Issues

Corrective Action Effectiveness for Pressurizer Level Channel L-461

The inspectors reviewed the effectiveness of the corrective actions associated with the resolution of an out-of-tolerance condition in pressurizer level channel III, L-461, and pressurizer level indicator (LI)-461. On February 3, 2017, L-461 had drifted out of the upper end of the acceptable tolerance band as previously documented in CR-IP2-2017-00477. Entergy had completed an operability determination and concluded that L-461 was operable because it would still perform its safety function. The as-left channel calibration for LI-461 was realigned under a temporary modification to bias the indicated 100 percent operating point downward by approximately 8 percent (CR-IP2-2017-00481) to offset the instrument drift in the high direction by adjusting LI-461 and LM-461 (signal conditioner). However, on January 22, 2018, L-461 drifted further out of tolerance in the high direction at the upper calibration point in the band. The as-left indication at 100 percent level for LI-461 was reading 96.0 percent with the surveillance test acceptance criteria from 97.2 percent to 102.8 percent which resulted in L-461 failing the surveillance test and not meeting the previously established revised operability criteria. If instrumentation and control had realigned the upper instrument calibration point upwards to restore tolerance at the high end of the instrument band, then LI-461 would subsequently fail the channel check criteria for comparison with the other pressurizer level instruments (LI-459 and LI-460) while at power (60 percent pressurizer programed level at 100 percent power).

Unit 2 has three safety-related channels for measuring pressurizer level L-459, L-460, and L-461. Biasing the 100 percent operating point for the level indicator, LI-461, realigns the indicated level, LI-461, in the control room but does not change the actual setpoint of the pressurizer level signal from the level transmitter, (LT)-461, to the reactor trip bistables. Biasing LI-461 downward by 8 percent to more accurately indicate pressurizer level implies that the actual level trip signal input to the bistables is higher (by 8 percent) than the indicated pressurizer level on LI-461 in the control room. If the level transmitters LT-459 and LT-460 for channels L-459 and L-460 were reading pressurizer level accurately, and LI-461 was not biased downward, LI-461 and LT-461 would be indicating 8 percent higher than the other channels and 8 percent higher than actual pressurizer level. This implies that on an increasing pressurizer level transient event, L-461 will trip the associated reactor protective system bistable sooner (at a lower actual pressurizer level) than the other channels.

Entergy determined that the most likely cause of the alignment error was the introduction of a gas bubble into the reference leg of the pressurizer level transmitter LT-461. LT-461 was subsequently replaced during the Unit 2 refueling outage in March/April of 2018 and the new pressure transmitter was calibrated satisfactorily for cold conditions in the pressurizer.

Following the restart from the refueling outage in April 2018, LI-461 still was indicating higher than the other pressurizer level channels, but remained within acceptable tolerance for surveillance testing and channel checks. On June 3, 2018, LI-461 was noted to be drifting higher than that other level instruments at the 100 percent power programed level (60 percent pressurizer level) during channel checks (CR-IP2-2018-03560). As a result, LI-461 was again

modified (biased low) to realign the upper point of the instrument band such that L-461 passed the surveillance test at 100 percent pressurizer level and LI-461 passed the channel checks at 60 percent level. On September 6, 2018, L-461 finally diverged at the high end of the instrument band and could not be further adjusted without challenging the channel check acceptance criteria for LI-461 in the mid-range. The as-left LI-461 pressurizer level was indicating 97 percent when the acceptance criteria was 98 percent to 102 percent (CR-IP2-2018-05070). Entergy referred to the operability determination in CR-IP2-2017-00481 and determined, as before, that channel L-461 remained operable because it could still perform its safety function to trip the reactor on an increasing pressurizer level transient prior to exceeding the high level setpoint at 89 percent pressurizer level. As before, the operability evaluation concluded that L-461 would send a trip signal early to the bistables (at a lower than required trip setpoint while pressurizer level was increasing) but that L-459 and L-460 bistables would not reach their trip setpoints until the required pressurizer level of 89 percent from the accident analysis. A reactor trip signal on high pressurizer level requires a coincidence of 2 of 3 channels to trip the reactor and would not occur until one of the other accurate channels reached 89 percent.

On December 21, 2018, at the 100 percent power programmed pressurizer level, LI-459 was indicating 54.3 percent, LI-460 was indicating 54.6 percent, and LI-461 was indicating high 61.7 percent. This meets the criteria for an acceptable channel check at 100 percent power (within 8 percent). However, LI-461 was still out of the acceptance band (low) for the high level reactor trip setpoint at this high end (100 percent pressurizer level) of the instrument band.

The inspectors concluded that channel L-461 is in an operable but degraded condition because the channel will trip at a higher trip setpoint than allowable in the accident analysis. L-461 is operable because L-461 will still perform its safety function (trip the reactor prior to 89 percent pressurizer level) but it will trip sooner (lower) on an increasing level transient than the other two channels. It is degraded because LT-461 is not calibrated within the acceptance conditions required under the setpoint control program which is part of the plant's design basis. Entergy considers L-461 to be operable but not degraded as stated in CR-IP2-2018-05070 in accordance with EN-OP-104, "Operability." The corrective actions taken during the last refueling outage in 2018 were considered to be reasonable but were ineffective in restoring L-461 within the acceptance criteria in TS 3.3.1. This degraded condition is not considered a significant condition adverse to quality and, as such, recurrence of the degraded condition is not required to be prevented, only corrected. If operation of Unit 2 continues beyond the scheduled final defueling outage in 2020, this condition will have to be corrected to restore compliance with 10 CFR Part 50, Appendix B, Criteria XVI, "Corrective Actions," prior to restart.

Observations	**71152 Annual Follow-Up of Selected Issues**
<u>Corrective Actions for Groundwater Contamination</u> The inspectors reviewed and assessed Entergy's corrective actions associated with a Notice of Violation (NOV) regarding 10 CFR 20.1406(c) for Entergy's failure to conduct operations to minimize the introduction of residual radioactivity into the subsurface of the site (VIO 05000247/2016003-07, Inadequate Control of Floor Drains to Minimize Groundwater	

Contamination, documented in Indian Point Integrated Inspection Report 05000247/2016003 and 05000286/2016003; EA-16-193 (ADAMS Accession No. ML17013A233)).

Observations: (Closed) VIO 05000247/2016003-07, January 2016 Groundwater Contamination. The inspectors interviewed personnel knowledgeable of the groundwater contamination events, interviewed members of Entergy's groundwater monitoring team and its contract hydrogeologists, reviewed documentation and building drawings, and conducted site walk down observations of the areas hardened (sealed) to prevent unmonitored releases of radioactive materials.

Description: In February 2016, Entergy notified the NRC of a significant increase in groundwater tritium levels measured at three monitoring wells (MW-30, MW-31, and MW-32) located near the Unit 2 fuel storage building (FSB). In August 2016, Entergy notified the NRC of the detection of Cobalt-58 measured in MW-32 located near the Unit 2 FSB.

The inspectors identified a Green NOV of 10 CFR 20.1406(c) for Entergy's failure to conduct operations to minimize the introduction of residual radioactivity into the subsurface of the site (groundwater). Specifically, on January 2016, a spill caused by multiple floor drain obstructions resulted in the backup of contaminated water onto the floor of the 35-foot elevation of the primary auxiliary building and the subfloor of the Unit 2 FSB with subsequent leakage to onsite groundwater. In June/July 2016, another event occurred due to an obstructed flow path through a floor drain in the FSB, which spilled to the subfloor and contaminated the onsite groundwater.

Entergy completed a root cause analysis and determined that a contributing cause was that the floor drain systems were not maintained clear of obstructions and interferences and that Entergy had not verified the ability of the floor drains to handle the volume and flowrates for draining activities being conducted. As a result, repeated spills of contaminated water within the radiological controlled area leaked to onsite groundwater.

Entergy's Response to NOV: In an NOV response letter to the NRC (Reply to a Notice of Violation; EA-16-193, Indian Point Nuclear Generating Unit No. 2, dated February 16, 2017 (ADAMS Accession No. ML17054C823)), Entergy stated the reason for the violation and corrective steps taken and results achieved as well as enhancements to prevent future occurrences. The corrective actions included:

1) Repairs were made to the floor drain system and the FSB sump pump 28.
2) Floor drain systems in the radiologically controlled areas at both Units 2 and 3 have been cleaned and inspected.
3) Preventative maintenance work orders were created to ensure periodic cleaning and inspection of the floor drain systems.
4) Plugging of the north sole plate drain line and installation of a backwater valve in the subfloor drain line were made.
5) Harden site structures to minimize potential releases of radiologically-contaminated fluids to groundwater.
6) Seal and coat FSB truck bay subfloor.
7) Seal and or replace designated building/structural joints with potential path to groundwater.

8) Site procedures associated with work activity risk analysis, EN-WM-104, “On Line Risk Assessment,” and groundwater protection, IP-SMM-CY-110, “Radiological Ground Water Monitoring Program,” have been revised to improve the identification of activities that if performed incorrectly, can cause an unmonitored release or discharge of radioactive material to the environment.
9) Site procedures 2-SOP-4.3.1, “Support Procedure-Spent Fuel Pit Cooling,” and 3-SOP-SFP-003, “Operation of the Backup Spent Fuel Pool Cooling System,” have been revised to include additional guidance requiring operators to confirm with Engineering that drain pathways are verified adequate for component draining prior to use, and to monitor the drain down to prevent leaks or spills.
10) A groundwater protection steering committee has been formed and includes senior representatives of those site departments having the greatest influence on groundwater protection. The committee meets at a frequency specified in site procedures to evaluate the groundwater protection program.
11) Entergy completed an internal self-assessment of the site groundwater protection program to identify and compliance gaps. Subject matter experts from Electric Power Research Institute also conducted an assessment of the site implementation of the objectives in Nuclear Energy Institute 07-07, “Industry Ground Water Protection Initiative – Final Guidance Document,” dated August 2007.
12) Equipment identification numbers have been established for the floor drains in the radiologically controlled areas at the site and entered into the site equipment database.
13) Building drawings have been updated with the location and equipment number for each floor drain in the radiologically-controlled area.
14) Entergy created and provided “Indian Point Groundwater Tritium Awareness Training” to provide employees an understanding of key issues surrounding groundwater tritium, the event at Indian Point in January of 2016, and prevention of uncontrolled releases of any contamination to the environment.

Results: The inspectors reviewed Entergy’s response to VIO 05000247/2016003-07 and determined that the causal analysis was appropriate. The inspectors reviewed Entergy’s corrective actions and determined that Entergy had completed the corrective actions provided in “Reply to a Notice of Violation; EA-16-193,” dated January 16, 2017, and full compliance was achieved. This violation is closed.

Observations	**71152 Semiannual Trend Review**
Inadequate Control of Fire Hazards and Seismic Hazards During in-plant inspection tours over the past six months, the inspectors had noted an increased adverse trend associated with the control of materials, tools, and/or equipment that could pose a potential fire or seismic hazards concern. In November 2018, the inspectors subsequently reviewed items entered into the corrective action program and noted a considerable number of relevant condition reports that were associated with this adverse trend.	

Inadequate Control of Fire Hazards

Fire hazards identified included improperly stored combustible or flammable materials, materials/equipment placed in locations blocking emergency egress pathways, and fire doors that had been propped open. The inspectors had identified a number of instances where the improper storage of combustible materials had challenged the transient combustible limits for the fire area. A review of condition reports then showed additional instances where combustible/flammable materials were found to be improperly stored – including aerosol canisters containing flammable material (CR-IP2-2018-02010 and CR-IP2-2018-06300), cans of flammable paint (CR-IP2-2018-01651 and CR-IP2-2018-06432), uncovered waste canisters (CR-IP2-2018-06432), removed insulation (CR-IP2-2018-00526), wood planks or pallets (CR-IP2-2018-06612 and CR-IP3-2018-02527), diesel generator lubrication oil (CR-IP3-2018-02958), and other materials (e.g., CR-IP2-2018-01093, CR-IP2-2018-03029, CR-IP2-2018-03664, CR-IP2-2018-05766, and CR-IP3-2018-03580).

In certain instances, workers responsible for the handling of combustible materials were unaware of associated requirements. In one such instance (CR-IP3-2018-02958), a TCE had been developed to address the removal and storage of diesel generator lubrication oil. Workers handling the lubrication oil subsequently moved the stored oil to a separate room, without realizing that the TCE did not allow for storage in this room. This separate room constituted a separate fire zone with different combustibles loading requirements.

The inspectors noted that Entergy addressed instances of inadequate storage of combustibles by correcting the issue and coaching responsible individuals. One instance was found to have led to a clock reset for the group involved (CR-IP3-2018-02527). At the time when the NRC inspectors first began to observe and track this trend, however, they did not note any corrective actions reflecting a more substantial organizational response, such as the reinforcement of standards across departments.

In late November 2018, a number of additional instances of combustible control issues were identified during a third-party (non-NRC) inspection performed at the site. Entergy captured the issues from this third-party inspection in CR-IP2-2018-06471 and conducted an organizational and programmatic screening in accordance with EN-LI-118, “Cause Evaluation Process.” Entergy also issued an operations learning clock reset to all site personnel, with the intent of communicating the issues and reinforcing requirements associated with the control of fire hazards.

In most instances, the NRC inspectors determined that the issues identified were individually minor performance deficiencies, in accordance with IMC 0612, "Power Reactor Inspection Reports," because they were not likely to affect equipment important to safety, did not result in the station exceeding any licensing basis requirements, and were promptly corrected. Therefore, those issues are not subject to enforcement action, in accordance with the NRC Enforcement Policy. However, the inspectors determined that two of the issues identified (CR-IP3-2018-02527 and CR-IP3-2018-02958) did result in the station exceeding combustibles loading limits listed in the Unit 3 FHA of record. A Green NCV of regulatory requirements associated with these two more-than-minor instances is discussed separately in this report.

Inadequate Control of Seismic Hazards

Instances of potential seismic hazards included the use of seismic restraints with an expired rigging inspection (CR-IP2-2018-01553), scaffolding found to be in contact with the Unit 2 containment liner during refueling outage activities (CR-IP2-2018-02205), unattended ladders that were not properly restrained or that were left free-standing (CR-IP2-2018-03700, CR-IP2-2018-05688, CR-IP3-2018-02283, and CR-IP3-2018-02388), an unsecured bucket of chains positioned above protected equipment (CR-IP3-2018-01448), and other inadequately stored/restrained equipment (e.g., CR-IP3-2018-01864 and CR-IP3-2018-02889).

In one instance (CR-IP2-2018-05822), free-standing scaffolding had been erected near control equipment, and this scaffolding exceeded dimensional limits established by station procedures. Entergy had implemented an engineering evaluation to justify the exceeded dimensions, in accordance with procedural requirements; however, this justification included relying on operator/worker intervention to prevent the interaction of the scaffolding with equipment during a seismic event. Reliance on prompt individual operator action to mitigate such a hazard could have the potential to pose both an industrial safety concern (i.e., if the responsible individual were to be injured by the scaffolding) and/or a nuclear safety concern (i.e., if attempts to prevent tipping/falling of the scaffolding were not sufficient to prevent interaction with equipment).

In some cases, attempts had been made to store materials in a manner that mitigated the likelihood of seismic interaction. However, the restraints put in place were either degraded (e.g., CR-IP2-2018-01553) or positioned in a manner that would not be effective in preventing interaction with sensitive equipment (e.g., CR-IP3-2018-01717).

Many of the instances of inadequate control of seismic hazards reviewed were found to have been initially identified by the NRC inspectors, rather than plant personnel. This reflected an apparent lack of sufficient sensitivity/understanding among personnel regarding the potential seismic hazards introduced by inadequately stored tools and equipment.

The NRC inspectors discussed the observed trend in seismic hazards issues with Entergy management. Following this discussion, Entergy captured the potential trend in CR-IP2-2019-00107 and developed corrective action to conduct a performance analysis, in accordance with procedure EN-LI-118, “Case Evaluation Process.” Through this assessment, Entergy intends to identify and address factors contributing to this trend.

The NRC inspectors determined that those issues, which entailed a failure to meet procedural requirements, were minor performance deficiencies, in accordance with IMC 0612, "Power Reactor Inspection Reports," because of the low likelihood of actual impact on safety-related equipment. Therefore, these issues are not subject to enforcement action in accordance with the Enforcement Policy

EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure.

- On January 10, 2019, the inspectors presented the quarterly resident inspector inspection results to Mr. Anthony Vitale, Site Vice President, and other members of the Entergy staff.

DOCUMENTS REVIEWED

Common Documents Used
Indian Point Units 2 and 3, Control Room Narrative Logs
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0-SOP-WEATHER-001, Seasonal Weather Preparation, Revision 5
0-SOP-WEATHER-002, Severe Weather Preparations, Revision 0
2-AOP-FLOOD1, Plant Flooding – Conventional Side, Revision 11
2-COL-30.1, Electric Heat Tracing, Revision 34
2-SOP-30.1, Electric Heat Tracing, Revision 31
3-AOP-FLOOD1, Flooding, Revision 10
3-IC-PC-N-T-1116S, Refueling Water Storage Tank Temperature Control, Revision 8

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3-COL-RW-002, Service Water System, Revision 51
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A235304, Heater Drains and Vents, Revision 25

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IP3-ANAL-FP-01325, Fire Damper Assembly Analysis, Revision 0
IP3-ANAL-FP-02143, Fire Hazards Analysis, Revision 5
IP3-CALC-FP-02795, Combustible Loading Calculation for IP3 Fire Hazards Analysis, Revision 2

Engineering Change Packages
EC-76353, Revise Combustible Loading Calculation IP-Calc-FP-02795 and Ancillary Fire Protection Engineering Evaluations to Address Issues Identified by CR-IP3-2017-05105, Revision 0
EC-80670, Revise Maximum Permissible Combustible Loading for IP3 480V SWGR Room to Recover Available Margin in Support of Future Transient Combustible Loading, Revision 0

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PFP-263, Transformer Yard, Exterior Buildings, Revision 0
PFP-351, 480V Switchgear Room, Control Building, Revision 15
PFP-352, Cable Spread Rooms/Battery Rooms, Control Building, Revision 10
PFP-362, General Floor Plan, Turbine Building, 15′-0″, Revision 14
PFP-362A, 6.9KV Switchgear Area, Turbine Building, Revision 12
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PFP-362E, Heater Drain Pumps, Revision 14
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PFP-362G, Main Condenser Water Box, Revision 11
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FR-C.1, Response to Inadequate Core Cooling, Revision 1
FR-C.2, Response to Degraded Core Cooling, Revision 3
FR-S.1, Response to Nuclear Power Generation – ATWS, Revision 2
IP-EP-120, EPIP, Classification, Revision 12
IP-EP-210, Emergency Plan Implementing Procedures, Central Control Room, Revision 23
IP-EP-AD13, IPEC Emergency Action Level Technical Bases, Revision 19
SACRG-1, Severe Accident Control Room Guideline, Revision 3
SACRG-2, Severe Accident Control Room Guideline after the TSC Is Functional, Revision 4

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EN-OP-104, Operability Determination Process, Revision 16
IP-SMM-LI-108, Event Notification and Reporting, Revision 23

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ISI-27223, Flow Diagram of the Service Water System Nuclear Steam Supply Plant, Revision 23

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EC-79544, IP3 Reheater Drain Elbow Failure – Plant Restart, Revision R-000, Sequence 1

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9321-F-27353, Flow Diagram, Safety Injection System, Sheet 1, Revision 44
EC-H-50010, Erosion Corrosion Inspection Turbine Building and Heater Bay Reheater Drain Piping Isometric from LCV-1105, 1105A, and 1105B to Feedwater Heaters 36A, B, and C, Revision 2
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IP-EP-251, Alternate Emergency Operations Center, Revision 6
IP-EP-AD13, IPEC Emergency Action Level Technical Bases, Revision 19
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SACRG-2, Severe Accident Control Room Guideline after the TSC Is Functional, Revision 4

Condition Reports (CR-IP2-) (*initiated in response to inspection)
2018-06740*

Condition Reports (CR-IP3-)
2018-03762 2018-03776 2018-03777

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Indian Point Energy Center Emergency Planning Training Drill Guide on December 12, 2018

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2-SOP-4.3.1, Spent Fuel Pit Cooling, Revision 33
3-SOP-SFP-003, Operation of the Backup Spent Fuel Pool Cooling System, Revision 24
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EN-LI-118, Cause Evaluation Process, Revision 28
EN-LI-121, Trending and Performance Review Process, Revision 25
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IP-SMM-CY-110, Radiological Ground Water Monitoring Program, Revision 9
IP-SMM-DC-910, Temporary Equipment, Revision 3

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