



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION I  
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October 27, 2017

Mr. Anthony J. Vitale  
Site Vice President  
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Buchanan, NY 10511-0249

**SUBJECT: INDIAN POINT NUCLEAR GENERATING – INTEGRATED INSPECTION  
REPORT 05000247/2017003 AND 05000286/2017003**

Dear Mr. Vitale:

On September 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Indian Point Nuclear Generating (Indian Point), Units 2 and 3. On October 20, 2017, 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 one finding of very low safety significance (Green) in this report. This finding involved a violation of NRC requirements. The NRC is treating this 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 this 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 a cross-cutting aspect assignment or a 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) 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

**/RA/**

Jonathan E. Greives, Acting Chief  
Reactor Projects Branch 2  
Division of Reactor Projects

Docket Nos. 50-247 and 50-286  
License Nos. DPR-26 and DPR-64

Enclosure:  
Inspection Report 05000247/2017003  
and 05000286/2017003 w/Attachment:  
Supplementary Information

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**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION I**

Docket Nos. 50-247 and 50-286

License Nos. DPR-26 and DPR-64

Report Nos. 05000247/2017003 and 05000286/2017003

Licensee: Entergy Nuclear Northeast (Entergy)

Facility: Indian Point Nuclear Generating, Units 2 and 3

Location: 450 Broadway, General Services Building  
Buchanan, NY 10511-0249

Dates: July 1, 2017, through September 30, 2017

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Division of Reactor Projects

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## SUMMARY

Inspection Report 05000247/2017003 and 05000286/2017003; 07/01/2017 – 09/30/2017; Indian Point Nuclear Generating (Indian Point), Units 2 and 3; Follow Up of Events and Notices of Enforcement Discretion.

This report covered a three-month period of inspection by resident inspectors and announced inspections performed by regional inspectors. The inspectors identified one finding of very low safety significance (Green), which was a non-cited violation (NCV). The significance of most findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects within the Cross-Cutting Areas," dated December 4, 2014. All violations of U.S. Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

### Cornerstone: Mitigating Systems

- Green. A self-revealing Green NCV of Technical Specification (TS) 5.4.1, "Procedures," with two examples was identified when Entergy failed to implement procedures to ensure correct system alignment for the nuclear instrumentation permissive interlock, P6, and auxiliary feedwater (AFW) flow transmitter, FI-1201. Entergy promptly corrected the alignment issues and entered them into their corrective action program (CAP) as condition report (CR)-IP2-2017-02193 for the P6 permissive interlock and CR-IP2-2017-02150 for the AFW flow transmitter.

This performance deficiency is more than minor because it affects the configuration control attribute of the Mitigating System cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, in both cases, the instrumentation was left disabled following maintenance such that they could not perform their safety functions required by TSs. Additionally, the first example was similar to IMC 0612, Appendix E, example 2.g, because Entergy changed plant modes from Mode 5 to Mode 2 without ensuring P6 was operable. The second example was similar to IMC 0612, Appendix E, examples 5.a and 5.b, because Entergy failed to return the AFW flow transmitter to service after the refueling outage. The inspectors assigned a cross-cutting aspect in the area of Human Performance, Work Management, because both examples demonstrated a failure in the planning, control, and execution of work, and a lack of coordination between work groups to ensure quality. [H.5] (Section 4OA3)

## REPORT DETAILS

### Summary of Plant Status

Unit 2 began the inspection period at 100 percent power. On September 18, 2017, the operators shutdown Unit 2 to facilitate repairs on the main boiler feed pumps (MBFPs). Following repairs, the operators returned the unit to 100 percent on September 22, 2017. Unit 2 remained at or near 100 percent power for the remainder of the inspection period.

Unit 3 operated at 100 percent power throughout the inspection period.

### 1. REACTOR SAFETY

#### **Cornerstones: Initiating Events, Mitigating Systems, and Barrier Integrity**

1R01 Adverse Weather Protection (71111.01 – 1 sample)

#### Summer Readiness of Offsite and Alternate Alternating Current (AC) Power Systems

##### a. Inspection Scope

The inspectors performed a review of plant features and procedures for the operation and continued availability of the offsite and alternate AC power system to evaluate readiness of the systems prior to seasonal high grid loading. The inspectors reviewed Entergy's procedures affecting these areas and the communications protocols between the transmission system operator and Entergy. This review focused on the material condition of the offsite and alternate AC power equipment. There were no changes to the established program since the last inspection. The inspectors assessed whether Entergy established and implemented appropriate procedures and protocols to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system. The inspectors evaluated the material condition of the associated equipment by interviewing the responsible system manager, reviewing CRs and open work orders (WOs), and walking down portions of the AC power systems including the 345 kilovolt (kV), 138kV, and 13.8kV switchyards. Documents reviewed for each section of the inspection report are listed in the Attachment.

##### b. Findings

No findings were identified.

## 1R04 Equipment Alignment

### Partial System Walkdowns (71111.04Q – 5 samples)

#### a. Inspection Scope

The inspectors performed partial walkdowns of the following systems:

#### Unit 2

- 21 and 22 emergency diesel generators (EDGs) while the 23 EDG was out of service for maintenance on July 10, 2017
- 23 component cooling water pump after planned maintenance and testing on July 27, 2017
- Auxiliary component cooling system after planned maintenance on August 2, 2017
- 23 AFW pump after planned maintenance and testing on August 31, 2017

#### Unit 3

- 31 AFW pump following in-service testing on August 22, 2017 (this sample was part of an in-depth review of the AFW system)

The inspectors selected these systems based on their risk-significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors reviewed applicable operating procedures, system diagrams, the updated final safety analysis report (UFSAR), TSs, WOs, CRs, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have impacted system performance of their intended safety functions. The inspectors also performed field walkdowns of accessible portions of the systems to verify system components and support equipment were aligned correctly and were operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no deficiencies. The inspectors also reviewed whether Entergy had properly identified equipment issues and entered them into the CAP for resolution with the appropriate significance characterization.

#### b. Findings

No findings were identified.

## 1R05 Fire Protection

### Resident Inspector Quarterly Walkdowns (71111.05Q – 6 samples)

#### a. Inspection Scope

The inspectors conducted tours of the areas listed below to assess the material condition and operational status of fire protection features. The inspectors verified that Entergy controlled combustible materials and ignition sources in accordance with administrative procedures. The inspectors verified that fire protection and suppression equipment were available for use as specified in the area pre-fire plan (PFP), and



passive fire barriers were maintained in good material condition. The inspectors also verified that station personnel implemented compensatory measures for out-of-service, degraded, or inoperable fire protection equipment, as applicable, in accordance with procedures.

### Unit 2

- Cable spreading room with the halon fire suppression system out of service (PFP-252) on July 17, 2017
- 480V switchgear room (PFP-251) on July 25, 2017
- Control building (PFP-152, PFP-252, PFP-252A, PFP-253, and PFP-254) on August 25, 2017
- EDG room (PFP-258) with intake louver 25 unable to close on August 28, 2017

### Unit 3

- Primary auxiliary building, 55-foot elevation (PFP-307 and PFP-307A) on August 24, 2017
- Control building (PFP-351, PFP-351A, PFP-352, PFP-352A, and PFP 353) on August 25, 2017

#### b. Findings

No findings were identified.

#### 1R06 Flood Protection Measures (71111.06 – 1 sample)

##### Internal Flooding Review

#### a. Inspection Scope

The inspectors reviewed the UFSAR and the individual plant examination for external events to identify internal flooding susceptibilities for the site. The inspectors' review focused on the AFW buildings for Units 2 and 3. The inspectors verified the adequacy of floor and water penetration seals, drain paths, and temporary flood barriers. The inspectors also reviewed the CAP to determine if Entergy was identifying and correcting problems associated with both flood mitigation features and site procedures for responding to flooding.

#### b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11Q – 3 samples)Unit 2.1 Quarterly Review of Licensed Operator Requalification Testing and Traininga. Inspection Scope

The inspectors observed licensed operator simulator training on August 31, 2017, which included a steam generator (SG) tube leak leading to rupture, with a failure of the automatic start function of some safety injection equipment. The inspectors evaluated operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification made by the shift manager and the TS action statements entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

.2 Quarterly Review of Licensed Operator Performance in the Main Control Rooma. Inspection Scope

The inspectors observed and reviewed plant startup operations conducted on September 19 to 20, 2017. The inspectors observed infrequently performed test or evolution briefings, pre-shift briefings, and reactivity control briefings to verify that the briefings met the criteria specified in Entergy's administrative procedure EN-OP-115, "Conduct of Operations." Additionally, the inspectors observed test performance to verify that procedure use, crew communications, and coordination of activities between work groups similarly met established expectations and standards.

b. Findings

No findings were identified.

Unit 3.3 Quarterly Review of Licensed Operator Requalification Testing and Traininga. Inspection Scope

The inspectors observed licensed operator simulator training on August 31, 2017, which included the failure of a SG level channel, a leak from the refueling water storage tank at 100 percent power, a spurious safety injection, a small break loss of coolant accident, and a loss of containment sump recirculation capability. The inspectors evaluated

operator performance during the simulated event and verified completion of risk significant operator actions, including the use of abnormal and emergency operating procedures. The inspectors assessed the clarity and effectiveness of communications, implementation of actions in response to alarms and degrading plant conditions, and the oversight and direction provided by the control room supervisor. The inspectors verified the accuracy and timeliness of the emergency classification and the TS action statements made by the shift manager and entered by the shift technical advisor. Additionally, the inspectors assessed the ability of the crew and training staff to identify and document crew performance problems.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12Q – 1 sample)

Routine Maintenance Effectiveness

a. Inspection Scope

The inspectors reviewed the samples listed below to assess the effectiveness of maintenance activities on structure, system, and component (SSC) performance and reliability. The inspectors reviewed system health reports, CAP documents, maintenance WOs, and maintenance rule basis documents to ensure that Entergy was identifying and properly evaluating performance problems within the scope of the maintenance rule. For each SSC sample selected, the inspectors verified that the SSC was properly scoped into the maintenance rule in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.65 and verified that the (a)(2) performance criteria established by Entergy was reasonable. As applicable, for SSCs classified as (a)(1), the inspectors assessed the adequacy of goals and corrective actions to return these SSCs to (a)(2). Additionally, the inspectors ensured that Entergy was identifying and addressing common cause failures that occurred within and across maintenance rule system boundaries.

Unit 3

- 125 volt direct current (VDC) power system completed on August 17, 2017

b. Findings

No findings were identified.

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13 – 4 samples)

a. Inspection Scope

The inspectors reviewed station evaluation and management of plant risk for the maintenance and emergent work activities listed below to verify that Entergy performed the appropriate risk assessments prior to removing equipment for work. The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that Entergy

performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When Entergy performed emergent work, the inspectors verified that operations personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work and discussed the results of the assessment with the station's probabilistic risk analyst to verify plant conditions were consistent with the risk assessment. The inspectors also reviewed the TS requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

#### Unit 2

- 22 auxiliary boiler feedwater pump (ABFP) out of service on August 1, 2017
- Outage risk for 2PO22 MBFP outage on September 19, 2017

#### Unit 3

- 32 component cooling water pump out of service on July 17, 2017
- 31 EDG out of service during surveillance testing of local operation of 31 ABFP on August 24, 2017 (this sample was part of an in-depth review of the ABFP system)

#### b. Findings

No findings were identified.

### 1R15 Operability Determinations and Functionality Assessments (71111.15 – 7 samples)

#### a. Inspection Scope

The inspectors reviewed operability determinations and functionality assessments for the following degraded or non-conforming conditions:

#### Unit 2

- Baffle former bolt degradation identified during 2RFO22 (CR-IP2-2016-02081) on September 5, 2017
- Installation of a non-seismic portable blower to remediate a steam leak blowing on PCV-1310B, AFW isolation valve to the turbine driven AFW pump (CR-IP2-2017-03225) on September 14, 2017
- Pressurizer pressure channel PT-456A reading low (CR-IP2-2017-02807) on September 15, 2017

#### Unit 3

- Service water piping support unable to handle any loads (CR-IP3-2017-03822) on August 2, 2017
- Baffle former bolt degradation identified during 3RFO19 (CR-IP3-2017-01577) on September 5, 2017
- Through-wall leak on CD-123 relief valve for the 32 ABFP (CR-IP3-2017-03515) on September 18, 2017

- Steam line pressure loops P-429B and P-449B failed calibration (CR-IP3-2017-04417) on September 19, 2017

The inspectors selected these issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the operability determinations to assess whether TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TSs and UFSAR to Entergy's evaluations to determine whether the components or systems were operable.

The inspectors confirmed, where appropriate, compliance with bounding limitations associated with the evaluations. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled by Entergy. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations.

b. Findings

No findings were identified.

1R17 Evaluation of Changes, Tests, or Experiments (71111.17T – 18 samples)

a. Inspection Scope

The inspectors verified that Entergy performed screens and evaluations of changes and tests in accordance with regulatory requirements and licensee implementing guidance. The inspectors reviewed safety evaluations to evaluate if changes to the facility or procedures, as described in the UFSAR, were reviewed and documented in accordance with 10 CFR 50.59 requirements. The safety evaluations reviewed were those completed by Entergy since the last NRC triennial 71111.17 inspection. In addition, the inspectors evaluated if Entergy was required to obtain NRC approval prior to implementing the changes. The inspectors interviewed Entergy personnel and reviewed supporting information including calculations, analyses, design change documentation, procedures, the UFSAR, TSs, and plant drawings to assess the adequacy of the safety evaluations. The inspectors compared the safety evaluations and supporting documents to the guidance and methods provided in Nuclear Energy Institute (NEI) 96-07, "Guidelines for 10 CFR 50.59 Evaluations," Revision 1 (ML003771157), as endorsed by NRC Regulatory Guide 1.187, "Guidance for Implementation of 10 CFR 50.59, Changes, Tests, and Experiments" (ML003759710), and Draft Guidance DG-1330, "Guidance for Developing Principal Design Criteria for Non-Light Water Reactors" (ML16301A307), to determine the adequacy of the safety evaluations.

The inspectors also reviewed a sample of screenings and applicability determinations for which Entergy concluded that a safety evaluation was not required. These reviews were performed to assess whether Entergy used a threshold for performing safety evaluations that was consistent with 10 CFR 50.59 standards. The inspectors included design changes, calculations, and procedure changes in the review. The screenings and applicability determinations were selected based on the safety significance, risk significance, and complexity of the change to the facility.

In addition, the inspectors compared Entergy's implementing administrative procedures used to control the screening, preparation, review, and approval of safety evaluations to the guidance referenced above to evaluate whether those procedures adequately implemented the requirements of 10 CFR 50.59.

The inspectors verified on a sampling basis that Entergy entered significant performance issues concerning their 10 CFR 50.59 program into their CAP. The inspectors further verified that Entergy developed appropriate corrective actions to address those issues.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18 – 2 samples)

Permanent Modifications

a. Inspection Scope

- The inspectors evaluated a permanent modification installed on Unit 2 that replaced the digital Lovejoy control system driver cards with analog driver cards to better interface with the speed control system for the 21 and 22 MBFPs under equivalent change (EC) 72950, "Design Equivalency for Replacement of 21 and 22 MBFP Turbine Speed Control System Drivers "A", "B" and "C" Transmitter/Isolator Modules with Newer Lovejoy Designed Replacement Modules, Revision 000." This modification was installed to correct control system instabilities that caused the track-and-hold feature of the Lovejoy system speed controllers to spuriously actuate leading to a loss of speed control on the MBFPs. The inspectors performed walkdowns of the control systems and verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification.
- The inspectors evaluated a permanent modification installed on Unit 3 that applied a protective coating of carbon fiber wrapping to the exterior of the American Society of Mechanical Engineers Class 3 service water piping in the Zurn strainer room as part of the implementation of EC 45426, "Refurbishment of Unit 3 Intake Structure Degraded Steel and Concrete Structural Components." Entergy coated the exterior surface of the pipe to prevent material loss due to mechanical damage and exterior corrosion. The inspectors performed walkdowns of the affected piping and verified that the design bases, licensing bases, and performance capability of the affected systems were not degraded by the modification. The inspectors confirmed that the carbon fiber wrap was not installed (or performed) as an American Society of Mechanical Engineers code repair. The inspectors also reviewed results of previous non-destructive evaluation testing of the piping to ensure that Entergy was monitoring material loss in accordance with SEP-SW-IPC-001, Indian Point Entergy Center NRC Generic Letter 89-13 Service Water Program.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19 – 4 samples)a. Inspection Scope

The inspectors reviewed the post-maintenance tests for the maintenance activities listed below to verify that procedures and test activities ensured system operability and functional capability. The inspectors reviewed the test procedure to verify that the procedure adequately tested the safety functions that may have been affected by the maintenance activity, that the acceptance criteria in the procedure was consistent with the information in the applicable licensing basis and/or design basis documents, and that the test results were properly reviewed and accepted and problems were appropriately documented. The inspectors also walked down the affected job site, observed the pre-job brief and post-job critique where possible, confirmed work site cleanliness was maintained, and witnessed the test or reviewed test data to verify quality control hold point were performed and checked, and that results adequately demonstrated restoration of the affected safety functions.

Unit 2

- 23 EDG fuel injector replacement on July 12, 2017
- 23 EDG air start tank inspection on July 12, 2017
- Appendix R diesel generator after jacket water leak repairs on September 15, 2017
- 22 MBFP after Lovejoy card replacement and servo maintenance on September 21, 2017

b. Findings

No findings were identified.

1R20 Refueling and Other Outage Activities (71111.20 – 1 sample)Planned Outagea. Inspection Scope

The inspectors reviewed the station's work schedule and outage risk plan for the Unit 2 planned maintenance outage (2PO22) to repair the 22 MBFP speed control system, which was conducted on September 18 to 20, 2017. The inspectors reviewed Entergy's development and implementation of outage plans and schedules to verify that risk, industry experience, previous site-specific problems, and defense-in-depth were considered. During the outage, the inspectors observed portions of the shutdown and startup, and monitored controls associated with the following outage activities:

- Configuration management, including maintenance of defense-in-depth, commensurate with the outage plan for the key safety functions and compliance with the applicable TSs when taking equipment out of service
- Implementation of clearance activities and confirmation that tags were properly hung and that equipment was appropriately configured to safely support the associated work or testing

- Status and configuration of electrical systems and switchyard activities to ensure that TSs were met
- Monitoring of decay heat removal operations
- Activities that could affect reactivity
- Control room operators during planned shutdown operations
- Reactor startup and ascension to full power operation
- Identification and resolution of problems related to refueling outage activities

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22 – 3 samples)

a. Inspection Scope

The inspectors observed performance of surveillance tests and/or reviewed test data of selected risk-significant SSCs to assess whether test results satisfied TSs, the UFSAR, and Entergy's procedure requirements. The inspectors verified that test acceptance criteria were clear, tests demonstrated operational readiness and were consistent with design documentation, test instrumentation had current calibrations and the range and accuracy for the application, tests were performed as written, and applicable test prerequisites were satisfied. Upon test completion, the inspectors considered whether the test results supported that equipment was capable of performing the required safety functions. The inspectors reviewed the following surveillance tests:

Unit 2

- 2-PT-M110, Appendix R Diesel Generator Functional Test, on July 20, 2017

Unit 3

- 3-PT-Q134A, 31 Residual Heat Removal Pump Quarterly Surveillance Test, on August 15, 2017
- 3-PT-Q120A, 31 AFW Pump In-Service Testing, on August 21, 2017

b. Findings

No findings were identified.

**Cornerstone: Emergency Preparedness**

1EP2 Alert and Notification System Evaluation (71114.02 – 1 sample)

a. Inspection Scope

An onsite review was conducted to assess the maintenance and testing of the Indian Point alert and notification system (ANS). During this inspection, the inspectors conducted a review of the Indian Point siren system and backup New York alert system with their associated maintenance programs. The inspectors reviewed the associated



ANS procedures and the Federal Emergency Management Agency ANS design report to ensure compliance with design report commitments for system maintenance and testing. The inspection was conducted in accordance with NRC Inspection Procedure 71114.02. 10 CFR 50.47(b)(5) and associated requirements of 10 CFR Part 50, Appendix E were used as reference criteria.

b. Findings

No findings were identified.

1EP3 Emergency Response Organization Staffing and Augmentation System (71114.03 – 1 sample)

a. Inspection Scope

The inspectors conducted a review of the Indian Point emergency response organization (ERO) augmentation staffing requirements and the process for notifying and augmenting the ERO. The review was performed to verify the readiness of key Entergy staff to respond to an emergency event and to verify Entergy's ability to activate their emergency response facilities (ERFs) in a timely manner. The inspectors reviewed the Indian Point emergency plan for ERF activation and ERO staffing requirements, the ERO duty roster, applicable station procedures, augmentation test reports, the most recent drive-in drill reports, and corrective action reports related to this inspection area. The inspectors also reviewed a sample of ERO responder training records to verify training and qualifications were up to date. The inspection was conducted in accordance with NRC Inspection Procedure 71114.03. 10 CFR 50.47(b)(2) and associated requirements of 10 CFR Part 50, Appendix E were used as reference criteria.

b. Findings

No findings were identified.

1EP5 Maintaining Emergency Preparedness (71114.05 – 1 sample)

a. Inspection Scope

The inspectors reviewed a number of activities to evaluate the efficacy of Entergy's efforts to maintain the Indian Point emergency preparedness (EP) program. The inspectors reviewed memorandums of agreement with offsite agencies; the 10 CFR 50.54(q) emergency plan change process and practice; Indian Point's maintenance of equipment important to EP; records of evacuation time estimate population evaluation; and provisions for, and implementation of, primary, backup, and alternative ERF maintenance. The inspectors also verified Entergy's compliance at Indian Point with NRC EP regulations regarding emergency action levels for hostile action events, protective actions for on-site personnel during events, emergency declaration timeliness, ERO augmentation and alternate facility capability, evacuation time estimate updates, on-shift ERO staffing analysis, and ANS back-up means.

The inspectors further evaluated Entergy's ability to maintain Indian Point's EP program through their identification and correction of EP weaknesses by reviewing a sample of drill reports, self-assessments, and 10 CFR 50.54(t) reviews. Also, the inspectors

reviewed a sample of EP-related CRs initiated at Indian Point from July 2015 through July 2017. The inspection was conducted in accordance with NRC Inspection Procedure 71114.05. 10 CFR 50.47(b) and the associated requirements of 10 CFR Part 50, Appendix E were used as reference criteria.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06 – 1 sample)

Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine Entergy emergency drill on September 13, 2017, to identify any weaknesses and deficiencies in the classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the simulator and emergency operations facility to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the station drill critique to compare inspector observations with those identified by Entergy in order to evaluate Entergy's critique and to verify whether Entergy was properly identifying weaknesses and entering them into the CAP.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstone: Public Radiation Safety and Occupational Radiation Safety**

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01 – 3 samples)

a. Inspection Scope

The inspectors reviewed Entergy's performance in assessing and controlling radiological hazards in the workplace. The inspectors used the requirements contained in 10 CFR Part 20, TSs, Regulatory Guide 8.38, and the procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the performance indicators (PIs) for the occupational exposure cornerstone, radiation protection program audits, and reports of operational occurrences in occupational radiation safety since the last inspection.

Contamination and Radioactive Material Control (1 sample)

The inspectors observed the monitoring of potentially contaminated material leaving the radiological controlled area and inspected the methods and radiation monitoring instrumentation used for control, survey, and release of that material. The inspectors selected several sealed sources from inventory records and assessed whether the sources were accounted for and were tested for loose surface contamination. The inspectors evaluated whether any recent transactions involving nationally tracked sources were reported in accordance with requirements.

Risk-Significant High Radiation Area and Very High Radiation Area Controls (1 sample)

The inspectors reviewed the procedures and controls for high radiation areas, very high radiation areas, and radiological transient areas in the plant.

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with radiation monitoring and exposure control (including operating experience) were identified at an appropriate threshold and properly addressed in the CAP.

b. Findings

No findings were identified.

2RS2 Occupational ALARA Planning and Controls (71124.02 – 1 sample)

a. Inspection Scope

The inspectors assessed Entergy's performance with respect to maintaining occupational individual and collective radiation exposures as low as is reasonably achievable (ALARA). The inspectors used the requirements contained in 10 CFR Part 20, Regulatory Guides 8.8 and 8.10, TSs, and procedures required by TSs as criteria for determining compliance.

Radiological Work Planning (1 sample)

The inspectors selected the following radiological work activities based on exposure significance for review:

- RWP 20173542, 3R19 Westinghouse-Baffle Bolt Removal/Repair and Associated Work
- RWP 20173518, 3R19 Scaffold Building Removal Inspections
- RWP 20173509, 3R19 Emergent Work
- RWP 20173520, 3R19 Outage Valve Work

For each of these activities, the inspectors reviewed ALARA work activity evaluations, exposure estimates, exposure reduction requirements, results achieved (dose rate reductions and actual dose), person-hour estimates and results achieved, and post-job reviews that were conducted to identify lessons learned.

b. Findings

No findings were identified.

2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03 – 4 samples)

a. Inspection Scope

The inspectors reviewed the control of in-plant airborne radioactivity and the use of respiratory protection devices in these areas. The inspectors used the requirements in 10 CFR Part 20, Regulatory Guides 8.15 and 8.25, NUREG/CR-0041, TSs, and procedures required by TSs as criteria for determining compliance.

Inspection Planning

The inspectors reviewed the UFSAR to identify ventilation and radiation monitoring systems associated with airborne radioactivity controls and respiratory protection equipment staged for emergency use. The inspectors also reviewed respiratory protection program procedures and current PIs for unintended internal exposure incidents.

Engineering Controls (1 sample)

The inspectors reviewed operability and use of both permanent and temporary ventilation systems and the adequacy of airborne radioactivity radiation monitoring in the plant based on location, sensitivity, and alarm set-points.

Use of Respiratory Protection Devices (1 sample)

The inspectors reviewed the adequacy of Entergy's use of respiratory protection devices in the plant to include applicable ALARA evaluations, respiratory protection device certification, respiratory equipment storage, air quality testing records, and individual qualification records.

Self-Contained Breathing Apparatus (SCBA) for Emergency Use (1 sample)

The inspectors reviewed the status and surveillance records for three SCBAs staged in-plant for use during emergencies, Entergy's SCBA procedures and maintenance and test records, the refilling and transporting of SCBA air bottles, SCBA mask size availability, and the qualifications of personnel performing service and repair of this equipment.

Problem Identification and Resolution (1 sample)

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were identified at an appropriate threshold and addressed in the CAP.

b. Findings

No findings were identified.

## 2RS5 Radiation Monitoring Instrumentation (71124.05 – 3 samples)

### a. Inspection Scope

The inspectors reviewed performance in assuring the accuracy and operability of radiation monitoring instruments used to protect occupational workers during plant operations and from postulated accidents. The inspectors used the requirements in 10 CFR Part 20, regulatory guides, American National Standards Institute (ANSI) 323A-1997, "Radiation Protection Instrumentation, Test and Calibration, Portable Survey Instruments," ANSI N323D-2002, "American National Standard for Installed Radiation Protection Instrumentation," ANSI N42.14-1991, "Calibration and Use of Germanium Spectrometers for the Measurement of Gamma-Ray Emission Rates of Radionuclides," and procedures required by TSs as criteria for determining compliance.

### Inspection Planning

The inspectors reviewed Entergy's UFSAR, radiation protection audits, records of in-service survey instrumentation, and procedures for instrument source checks and calibrations.

### Walkdowns and Observations (1 sample)

The inspectors conducted walkdowns of plant area radiation monitors and continuous air monitors. The inspectors assessed material condition of these instruments and that the monitor configurations aligned with the UFSAR. The inspectors checked the calibration and source check status of various portable radiation survey instruments and contamination detection monitors for personnel and equipment.

### Calibration and Testing Program (1 sample)

For the following radiation detection instrumentation, the inspectors reviewed the current detector and electronic channel calibration, functional testing results, alarm set-points, and the use of scaling factors: laboratory analytical instruments, whole body counter, containment high-range monitors, portal monitors, personnel contamination monitors, small article monitors, portable survey instruments, area radiation monitors, electronic dosimetry, air samplers, and continuous air monitors. The inspectors reviewed the calibration standards used for portable instrument calibrations and response checks to verify that instruments were calibrated by a facility that used National Institute of Science and Technology traceable sources.

### Problem Identification and Resolution (1 sample)

The inspectors verified that problems associated with radiation monitoring instrumentation (including failed calibrations) were identified at an appropriate threshold and properly addressed in the CAP.

### b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

##### 4OA1 Performance Indicator Verification (71151 –15 samples)

##### .1 Mitigating Systems Performance Index (10 samples)

###### a. Inspection Scope

The inspectors reviewed Entergy's submittals for the following Mitigating Systems cornerstone PIs for the period July 1, 2016, through June 30, 2017:

###### Unit 2

- Emergency AC Power System (MS06)
- High Pressure Injection System (MS07)
- Heat Removal System (MS08)
- Residual Heat Removal System (MS09)
- Cooling Water Systems (MS10)

###### Unit 3

- Emergency AC Power System (MS06)
- High Pressure Injection System (MS07)
- Heat Removal System (MS08)
- Residual Heat Removal System (MS09)
- Cooling Water Systems (MS10)

To determine the accuracy of the PI data reported during those periods, the inspectors used definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7. The inspectors also reviewed Entergy's operator narrative logs, CRs, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports to validate the accuracy of the submittals.

###### b. Findings

No findings were identified.

##### .2 Emergency Preparedness Performance Indicators (3 samples)

###### a. Inspection Scope

The inspectors reviewed data for the following three EP PIs: (1) drill and exercise performance, (2) ERO drill participation, and (3) ANS reliability. The last NRC EP inspection at Indian Point was conducted in the third calendar quarter of 2016. Therefore, the inspectors reviewed supporting documentation from EP drills and equipment tests from the third calendar quarter of 2016 through the second calendar quarter of 2017 to verify the accuracy of the reported PI data. The review of the PIs was conducted in accordance with NRC Inspection Procedure 71151. The acceptance

criteria documented in NEI 99-02, "Regulatory Assessment Performance Indicator Guidelines," Revision 7, was used as reference criteria.

b. Findings

No findings were identified.

.3 Occupational Exposure Control Effectiveness (1 sample)

a. Inspection Scope

The inspectors reviewed Entergy submittals for the occupational radiological occurrences PI for the first quarter 2017 through the second quarter 2017. The inspectors used PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine the accuracy of the PI data reported. The inspectors reviewed electronic personal dosimetry accumulated dose alarms, dose reports, and dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized PI occurrences. The inspectors conducted walkdowns of various locked high and very high radiation area entrances to determine the adequacy of the controls in place for these areas.

b. Findings

No findings were identified.

.4 Radiological Effluent TS/Offsite Dose Calculation Manual Radiological Effluent Occurrences (1 sample)

a. Inspection Scope

The inspectors reviewed Entergy submittals for the radiological effluent TS/Offsite Dose Calculation Manual radiological effluent occurrences PI for the first quarter 2017 through the second quarter 2017. The inspectors used PI definitions and guidance contained in NEI 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, to determine if the PI data was reported properly. The inspectors reviewed the public dose assessments for the PI for public radiation safety to determine if related data was accurately calculated and reported.

The inspectors reviewed the CAP database to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous and liquid effluent summary data and the results of associated offsite dose calculations to determine if indicator results were accurately reported.

b. Findings

No findings were identified.

#### 4OA2 Problem Identification and Resolution (71152 – 4 samples)

##### .1 Routine Review of Problem Identification and Resolution Activities

###### a. Inspection Scope

As required by Inspection Procedure 71152, “Problem Identification and Resolution,” the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that Entergy entered issues into the CAP at an appropriate threshold, gave adequate attention to timely corrective actions, and identified and addressed adverse trends. In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow up, the inspectors performed a daily screening of items entered into the CAP and periodically attended CR screening meetings.

###### b. Findings

No findings were identified.

##### .2 Annual Sample: Failure of Baffle Former Bolts Due to Irradiation Assisted Stress Corrosion Cracking

###### a. Inspection Scope

The inspectors performed an in-depth review of Entergy’s corrective actions, materials testing report, and root cause evaluation associated with CR-IP2-2016-02348 for baffle former bolts found with indications of degradation during 2RFO22. This NRC inspection was performed as a follow-up to the preliminary root cause of the Unit 2 baffle former bolt failures after the materials testing of bolts removed from the reactor vessel was completed.

Entergy discovered an unexpected number of degraded baffle former bolts through planned examinations during the Unit 2 refueling outage and reported the issue to the NRC as Event Notification No. 51829 on March 29, 2016, because the as-found number and location of degraded bolts represented an unanalyzed condition. Entergy staff completed corrective actions to replace all of the potentially degraded baffle former bolts on Unit 2; and during replacement activities, Entergy staff quarantined and shipped a population of removed baffle former bolts to a materials testing facility to confirm the cause of the bolt degradation.

The inspectors assessed Entergy’s problem identification threshold, cause analyses, compensatory actions, and the prioritization and timeliness of Entergy’s corrective actions to determine whether Entergy staff were properly identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to Entergy’s CAP and the requirements of 10 CFR Part 50, Appendix B. The inspectors discussed the results of the materials testing with engineering personnel to assess the root cause evaluation and to further assess the effectiveness of the implemented corrective actions.



b. Findings and Observations

No findings were identified.

Entergy staff preliminarily determined the root cause of the degraded and failed baffle former bolts was primarily due to irradiation-assisted stress corrosion cracking (IASCC) in combination with stress fatigue. IASCC is a cracking mechanism that occurs over a long period of time when susceptible metals are exposed to neutron radiation from the reactor core and stresses as part of normal design and operation. This preliminary determination was based on industry operating experience related to baffle former bolt failures in both foreign and domestic plants. Entergy staff provided a sample of baffle former bolts removed from the Unit 2 reactor vessel to a metallurgical laboratory for detailed failure analysis in order to confirm the root cause. Fractography, which is the study of a materials fracture surface, was used to determine the cause of the observed baffle former bolt failures. The fractography test report concluded that all of the cracking initiated from an intergranular (IG) mode and that the cracking propagated to failure from IG or a combination of IG and transgranular. The significant amount of IG cracking, including numerous IG initiation sites, strongly indicated IASCC was fundamental to the failures, and the portions of observed transgranular cracking were attributed to fatigue based on the crack morphology. These test results confirmed that cracking first initiated by IASCC and then propagated by cyclical/fatigue loading caused by normal and transient operational loading.

The inspectors reviewed Entergy's root cause evaluation and the fractography report of the removed Unit 2 baffle former bolt failures. The inspectors concluded that Entergy staff conducted an appropriate review to identify and confirm the causes of the degraded and failed baffle former bolts. Entergy revised their Indian Point reactor vessels internals program to perform ultrasonic inspections of 100 percent of the original baffle former bolts during each of the subsequent refueling outages as well as a general visual inspection of the baffle structure, including any replaced bolts. The inspectors noted that the re-examinations of the baffle former bolts were planned to be conducted more frequently than the recently issued industry program guidance. Based on discussions with engineering staff, the inspectors learned that Entergy cancelled its initial plans to perform a modification to convert the Unit 2 core barrel assembly from a "downflow" to an "upflow" configuration. The inspectors determined Entergy's overall response to the issue was commensurate with safety significance, was timely, and included appropriate corrective actions.

The inspectors also reviewed information from Unit 3 baffle former bolt examinations performed during its spring 2017 refueling outage and determined that Entergy had performed a technical evaluation prior to the outage that bounded the as-found conditions. This evaluation used the approach documented in Westinghouse Nuclear Safety Advisory Letter NSAL-16-1, dated July 5, 2016, to assess the impact of significantly clustered bolt failures during a design basis accident. Because the as-found Unit 3 baffle former bolt condition was analyzed and determined not to significantly degrade plant safety, the condition was not reportable.

(Closed) Unresolved Item (URI) 05000247/2016-001-01: Baffle Former Bolts with Identified Anomalies

On March 29, 2016, Entergy reported to the NRC that the level of degradation of Unit 2 baffle former bolts was a condition not previously analyzed. The NRC opened a URI to determine whether there was a performance deficiency associated with the degraded baffle former bolt condition. In April and May 2016, the inspectors conducted additional inspections at Unit 2 to review the ultrasonic testing procedure and results from the examination of the baffle former bolts and to review video recordings of the reactor vessel during previous refueling outages. The inspectors conducted the inspection in this report as a follow-up to review Entergy's materials testing report of baffle former bolts removed from Unit 2 as part of the bolt replacement corrective actions and to assess the test results impact on the root cause evaluation. The inspectors also evaluated Entergy's response to the baffle former bolt examination results from Unit 3 during its spring 2017 outage. The inspectors determined that Entergy took appropriate action to confirm the root cause of the degraded baffle former bolts. The inspectors did not identify any findings during the follow-up inspections for the URI. This URI is closed.

.3 Annual Sample: Reactor Vessel Head O-ring Leaks

a. Inspection Scope

The inspectors performed an in-depth review of Entergy's evaluation and corrective actions associated with repeated reactor coolant system (RCS) leakage through the reactor vessel head O-rings. The inspectors reviewed CRs and corrective actions associated with the eight reactor vessel head O-rings leaks that had occurred at Indian Point since 2003. Specifically, the inspectors reviewed the corrective actions to verify they were addressing the identified conditions adverse to quality. The inspectors reviewed Entergy's maintenance history records and causal analyses.

The inspectors assessed Entergy's problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of corrective actions to determine whether Entergy was appropriately identifying, characterizing, and correcting problems associated with this issue and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Entergy's CAP and 10 CFR Part 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

The reactor pressure vessel (RPV) is designed to be sealed by two large diameter (different size), concentric, circular, silver-coated, stainless steel gasket O-rings. These O-rings are seated in machined grooves between the RPV head and the vessel. Two new O-rings are routinely installed each outage when the RPV head is bolted closed. The inner O-ring normally maintains the pressure seal for the RCS boundary. The outer O-ring is a pre-installed redundant spare that is designed to be used if the inner O-ring leaks. Leakage through the inner O-ring can be identified via a leakoff line between the inner and outer O-rings. The operators can place the outer O-ring in service by closing

the leakoff line. This transfers the RCS boundary sealing surface to the outer O-ring. TS 3.4.13, "RCS Operational Leakage," establishes limits for the leak rate for identified and unidentified RCS leakage. Leakage through the RPV O-rings is not classified as "pressure boundary leakage" under TS 1.1, "Definitions," because the leakage is past a mechanical joint (gasket) and not through a "non-isolable fault in an RCS component body, pipe wall or vessel wall." Leakage through the O-rings into containment would be measured and compared to the limits in TS 3.4.13.

The inspectors reviewed CRs and corrective actions associated with the eight reactor vessel head O-rings leaks that occurred since 2003, when a design change to the O-rings occurred. Leakage through the O-rings prior to the design change may have been in part caused by the original design. In each case when both the inner and outer O-rings leaked, Entergy identified and monitored the leakage at a very low level and took prudent, conservative action to shut down the plant before approaching the TS limit to effect repairs and identify causal factors that potentially led to the leakage. Corrective actions since the design change have been primarily focused on revisions to procedures and processes. Changes to procedures 2-REF-002-GEN and 3-REF-002-GEN included new instructions to manually clean and dry the vessel flange seating surface prior to landing the head instead of relying on the underwater flange-cleaning machine. Additional revisions directed the use of a "star" pattern when torquing the O-ring retainer clips, use of a feeler gauge to verify the O-ring was centered in the groove, performance of a second verification, and ensuring an O-ring handling rig was used for installation. Corrective actions also included replacement of the O-rings with new O-rings during the next opportunity. The most recent corrective actions were implemented to prevent changes in residual heat removal flow from disrupting the O-ring seal surfaces prior to final bolting of the RPV head.

Corrective actions to address the various causal factors over the years have not been completely effective at preventing recurrence of the issue. This is acceptable per Entergy's CAP because each leak is characterized as a condition adverse to quality, vice a significant condition adverse to quality. Entergy has the ability to monitor for leakage and take actions to maintain compliance with their TS. Leakage through the O-rings has not challenged the limits of TS 3.4.13. Both Units 2 and 3 are currently operating on the outer O-rings with no measurable leakage.

In review of all the corrective actions taken since 2003, the inspectors noted that Entergy had not taken detailed depth measurements of the RPV flange seating surface degradation since 2015, when surface defects identified were small. These surface defects had been noted again during the May 2017 outage to repair the leaking O-rings. However, this degradation had been visually assessed to be minor in nature and the replacement O-ring was evaluated as being capable of deforming to seal these minor defects. Entergy is presently planning to conduct laser measurement and mapping of these defects during the next refueling outage on each unit.

Finally, the inspectors also noted that procedure EN-HU-106, "Procedure and Work Instruction Use and Adherence," states that technical procedures should be designated "continuous use" if the activity is complex or is performed infrequently to ensure that the procedural steps are performed as written in stepwise sequence. Although the reactor vessel head O-ring replacement and head installation are complex activities typically performed only once per cycle, the governing procedures are designated as "reference use." EH-HU-106 also defines a "continuous use" procedure, "for complex or infrequent

work activities for which consequences of an improper action could have immediate, possibly irreversible impact on safety, production or reliability.” Though the usage designation of 2-REF-GEN-002 and 3-REF-GEN-002 has not been identified as causal to any of the leaks, inspectors determined that Entergy should further evaluate the categorization of the RPV head installation procedure to ensure it meets their requirements and expectations and ensures that previous corrective actions continue to be implemented as intended.

.4 Annual Sample: EDG Voltage Control/Corrective Actions for Automatic Voltage Regulator (AVR) Cards

a. Inspection Scope

The inspectors performed an in-depth review of Entergy’s apparent cause analysis and corrective actions associated with CR-IP2-2016-01260 and CR-IP3-2016-01370. Specifically, on March 7 and 10, 2016, Unit 2 experienced a loss of vital bus power during a refueling outage. These events were caused by a degraded AVR card on the 23 EDG. A review of past operating experience identified a 10 CFR 50.21 report from 2007 that had identified the potential for a solder joint on the AVR card to degrade and result in the loss of automatic voltage control. Entergy had not taken the remedial actions recommended in the 10 CFR 50.21 report (ML072750470) prior to the failures. After experiencing the loss of vital bus on Unit 2, Entergy implemented the recommended corrective actions for both units. The inspectors reviewed the effectiveness of the implementation of the corrective actions in this inspection.

The inspectors assessed Entergy’s problem identification threshold, cause analyses, extent of condition reviews, compensatory actions, and the prioritization and timeliness of Entergy corrective actions to determine whether Entergy was appropriately identifying, characterizing, and correcting problems associated with this issue, and whether the planned or completed corrective actions were appropriate. The inspectors compared the actions taken to the requirements of Entergy’s CAP and 10 CFR Part 50, Appendix B. In addition, the inspectors performed field walkdowns and interviewed engineering personnel to assess the effectiveness of the implemented corrective actions.

b. Findings and Observations

No findings were identified.

On March 7, 2016, Unit 2 experienced a loss of vital bus when 23 EDG failed to run during a surveillance test. This failure was initially attributed to failed overcurrent trip relays which were replaced. Subsequently, on March 10, 2016, a second loss of the 23 EDG occurred which resulted in a loss of power to all vital buses and a loss of shutdown cooling. The preliminary causal analysis indicated that the trip was caused by a degraded solder joint on the AVR card resulting in a loss of voltage control for the 23 EDG generator and an over-current condition. After analysis in the laboratory, Entergy determined that they had failed to take recommended remedial actions from a 10 CFR 50.21 report (ML072750470) from 2007 to identify and remediate the degraded solder joint prior to failure. This event was initially documented in URI 05000247/2016001-06, 23 Emergency Diesel Generator Automatic Voltage Regulator Failure. The inspectors subsequently documented a Green NCV, 05000247/2016003-02, Missed Inspections on Automatic Voltage Regulator Cards

Results in 23 Emergency Diesel Generator Failure to Run. In October 2016, the inspectors identified that Entergy had not promptly remediated the same conditions on the Unit 3 EDG AVR cards and previously documented this issue under NCV 05000286/2016003-03, Untimely Corrective Actions to Address Degraded Automatic Voltage Regulator Card (on the Unit 3 EDGs). The results of the inspections indicated that the L1 magnetic amplifier solder joints on the AVR cards were degraded for both units.

Entergy submitted Licensee Event Report (LER) 05000247/2016-002-00, Automatic Actuation of Emergency Diesel Generators Due to 480 VAC Bus Undervoltage Condition and Loss of Residual Heat Removal While in Cold Shutdown, by IPEC Letter NL-17-030 dated May 6, 2016. This LER reported that the failure of the 23 EDG on March 10, 2016, was caused by the degraded solder joint on the AVR card but did not reach a conclusion regarding the failure of the 23 EDG on March 7, 2016. Further analysis resulted in the determination that both failures (March 7 and 10, 2016) were most likely the result of a degraded solder joint on the AVR card. On February 28, 2017, Entergy revised LER 05000247/2016-002-01, Automatic Actuation of Emergency Diesel Generators Due to 480 VAC Bus Undervoltage Condition and Loss of Residual Heat Removal While in Cold Shutdown, by IPEC Letter NL-17-030 dated February 28, 2017, to reflect this analysis.

The inspectors determined that Entergy had completed all required remedial actions specified by the vendor on both units. The AVR cards for all EDGs were either replaced or repaired. A preventive maintenance requirement was established to inspect the AVR card solder joints at the period recommended by the vendor for solder joint degradation. Entergy also reviewed the applicability of this operating experience by conducting a thorough extent of condition assessment for AVRs on other generating assets such as the Appendix R diesels and the main generators.

## .5 Annual Sample: Measuring and Testing Equipment (M&TE) Program

### a. Inspection Scope

The inspectors examined the facilities for the M&TE, the automated tool inventory control and tracking system, and the process for checking out and checking in M&TE. The inspectors reviewed the fleet and site procedures as well as CRs relating to M&TE, including a root cause evaluation from 2014 which was revised as recent as 2016. The inspectors interviewed employees about the M&TE program. The inspectors reviewed a sample of equipment as well as components for consistency with the M&TE program. The inspectors verified that Entergy's FSAR commitments relative to the control of M&TE are in accordance with regulatory requirements and are being met. Additionally, the inspectors verified that Entergy has addressed criteria and responsibility for determination of calibration frequency, a method of identification of each device and its calibration status, and a method for documenting M&TE calibration history.

### b. Findings and Observations

No findings were identified.

The inspectors generally found that Entergy demonstrated adequate commitment to M&TE implementation and oversight, individual contributors followed M&TE program

procedures, and fleet and site written guidance provided clear guidance. Inspectors also generally found that the program had clearly defined roles, responsibilities, and accountability for program implementation.

4OA3 Follow Up of Events and Notices of Enforcement Discretion (71153 – 4 samples)

.1 Plant Events

a. Inspection Scope

For the plant event listed below, the inspectors reviewed and/or observed plant parameters, reviewed personnel performance, and evaluated performance of mitigating systems. The inspectors communicated the plant event to appropriate regional personnel and compared the event details with criteria contained in IMC 0309, "Reactive Inspection Decision Basis for Reactors," for consideration of potential reactive inspection activities. As applicable, the inspectors verified that Entergy made appropriate emergency classification assessments and properly reported the event in accordance with 10 CFR 50.72 and 50.73. The inspectors reviewed Entergy's follow-up actions related to the event to assure that Entergy implemented appropriate corrective actions commensurate with their safety significance.

Unit 3

- Excessive bonnet leakage from chemical volume control system valve on June 11, 2017 (Event Notification 52801)

b. Findings

Introduction. A self-revealing Green NCV of TS 5.4.1 with two examples was identified because Entergy did not implement procedures to ensure correct system alignment for the nuclear instrumentation permissive interlock, P6, and AFW flow transmitter, FI-1201.

Description. Entergy failed to properly restore some instrumentation functions to service following the completion of surveillance testing or troubleshooting as required. This has resulted in some instrumentation safety functions not being readily available when required. Two recent self-revealing examples of components being improperly restored to service were analyzed by NRC inspectors.

**Example 1: Nuclear Instrumentation Permissive Interlock, P6**

On June 27, 2017, while Unit 2 was in Mode 3, Instrumentation and Control (I&C) technicians performed 2-PT-V63A, Reactor Protection System Logic Train 'A' Partial Function Test. This testing procedure is required to conform to standards as set forth in Section 5.4.1 of the Indian Point Unit 2 TSs, specifically complying with Regulatory Guide 1.33, Revision 2. This test involved verification of the P6 permissive interlock setpoint, which enables the reactor operators to manually block the source range high-flux trip when intermediate range channels are greater than  $10^{-10}$  amps. The operators can then manually de-energize source range instruments in order to continue raising power above the source range high flux trip setpoint on the source range monitors once reactor power is high enough to use the intermediate range monitors and overlap has been verified. The manual block of the high source range reactor trip is

procedurally required during reactor start up. The block setpoint overlaps with the intermediate range detector lower range of  $2.5 \times 10^{-11}$  amps and is meant to ensure verification of intermediate range detector operability prior to raising power. The safety function of the P6 permissive interlock is to automatically re-engage the source range high-flux trip automatically if power subsequently decreases below the intermediate range detector lower range after it has been manually blocked.

Upon completing the work in Mode 3, the technicians left the P6 permissive interlock disabled. The reactor protection system (RPS) switch lineup to re-enable the P6 permissive circuit was not completed prior to entry into Mode 2 resulting in a tripped state of both channels of the P6 permissive interlock during the subsequent startup. On June 28, 2017, while in Mode 2 during reactor startup, when power was raised above the P6 permissive enabled setpoint ( $1 \times 10^{-10}$  amps), the source range trip permissive interlock failed to activate resulting in the inability of the operators to manually block the source range instruments. The operators reinserted the control rods to bring the unit back to Mode 3. Upon identification of the misaligned switches, operators declared the P6 permissive inoperable and entered the issue into the CAP as CR-IP2-2017-02193. Entergy subsequently enabled the P6 permissive switches, completed the reactor startup, and performed an extent-of-condition evaluation, which verified that no other RPS logic switches were misaligned.

#### **Example 2: AFW Flow Transmitter, FI-1201**

On March 6, 2017, I&C technicians performed maintenance and testing on the 22 SG AFW flow indicator (FI-1201). During this maintenance activity, isolation of the high and low isolation valves and opening of the equalizing valve to relieve pressure was required. The transmitter was then restored to service with the exception of filling and venting. During this time, the root valves were tagged out and the source of water was isolated, preventing proper filling and venting. The I&C supervisor discussed the restoration of the transmitter with the operations shift manager, and it was agreed that operations would complete restoration of the transmitter when the tag-out was removed. I&C noted this and marked "N/A" for the steps required to return the transmitter to service, which is permitted by procedure. However, the procedure also specifies that a second knowledgeable individual must agree with the steps or sections marked "N/A" and initial and date each step or section prior to considering the document complete. The I&C supervisor did not obtain the shift manager's initials prior to considering the document complete and, ultimately, Operations did not restore the transmitter to service by filling and venting.

On June 26, 2017, while in Mode 3 immediately after manually tripping the reactor, operators received an alarm that there was no flow from FI-1201. After immediate verification to determine feed flow, Entergy determined this alarm was due to instrument failure. Upon further investigation, Entergy determined that FI-1201 was not filled and vented, resulting in inoperability.

Analysis. Failing to correctly align plant instrumentation per plant procedures following maintenance is a performance deficiency because it was reasonably within Entergy's ability to foresee and correct and should have been prevented. The performance deficiency is more than minor because it affects the configuration control attribute of the Mitigating System cornerstone to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core

damage). Specifically, in both cases, the instrumentation was left disabled following maintenance such that they could not perform their safety functions required by TSs.

Additionally, the first example was similar to IMC 0612, Appendix E, example 2.g, because Entergy changed plant modes from Mode 5 to Mode 2 without ensuring P6 was operable per TS 3.3.1, "RPS Instrumentation," which was in violation of TS 3.0.4. NRC inspectors determined this example is of very low safety significance (Green) using IMC 0609, Appendix A, "Mitigating Systems – Mitigating SSCs and Functionality," because it did not involve a deficiency in the design or qualification of the SSC, did not represent the loss of function, did not exceed the TS allowed outage time, and did not represent loss of function for one or more non-TS trains of equipment designed as high safety significance.

The second example was similar to IMC 0612, Appendix E, examples 5.a and 5.b, because Entergy failed to return the AFW flow transmitter to service after the refueling outage and resulted in a violation of TS 3.3.3, "Post Accident Monitoring Instrumentation." NRC inspectors determined this example is also of very low safety significance (Green) using IMC 0609, Appendix A, "Mitigating Systems – Mitigating SSCs and Functionality," because it did not involve a deficiency in the design or qualification of the SSC, did not represent the loss of function, and did not represent loss of function for one or more non-TS trains of equipment designed as high safety significance. Specifically, though the flow indicator did exceed its TS allowed outage time, it did not result in loss of function or operability of the safety-related AFW system.

This finding had a cross-cutting aspect in the area of Human Performance, Work Management, because each example exhibited a failure in the planning, control, and execution of work and a lack of coordination between work groups that would have prevented the performance deficiency. Specifically, the work process should ensure individuals are aware of plant status, the nuclear safety risks associated with work in the field, and other parallel station activities [H.5].

Enforcement. Unit 2 TS 5.4.1, "Procedures," requires, in part, that written procedures shall be implemented covering listed activities, in Regulatory Guide 1.33, Appendix A, Revision 2. Section 3 of Appendix A to Regulatory Guide 1.33 specifies, in part, that instructions including energizing, filling, venting, and changing modes of operation should be prepared and appropriate for the reactor protection and AFW systems. 2-PT-V63A, "Reactor Protection Logic Train 'A' Partial Function Test," and 2-PT-V63B, "Reactor Protection Logic Train 'B' Partial Function Test," are the implementing procedures for surveillance testing as required by TS 3.3.1. 2-PC-EM8A, "Auxiliary Feedwater Flow Instruments," Revision 5, is the procedure for calibrating the component as required by TS 3.3.3, "Post Accident Monitoring." OAP-019, "Component Verification and System Status Control," Revision 7, is the procedure which specifies configuration control of plant components.

Contrary to the above, Entergy did not properly implement the procedures used to calibrate and align these instruments. Specifically, Entergy failed to properly implement procedures to calibrate and align the RPS logic system, P6 permissive interlock, which rendered the interlock inoperable from June 26, 2017, to June 27, 2017, and the AFW flow transmitter, which rendered it inoperable from March 6, 2017, to June 26, 2017.



Upon discovery of each inoperability, Entergy corrected the system configuration and entered the issues into their CAP as CR-IP2-2017-02193 and CR-IP2-2017-02150, respectively.

This violation is very low safety significance (Green) and is being treated as an NCV, consistent with Section 2.3.2.a of the Enforcement Policy. **(NCV 05000247/2017-003-01, Component Misalignments Following Scheduled Maintenance)**

.2 (Closed) LER 05000247/2016-004-00: Unanalyzed Condition Due to Degraded Reactor Baffle Former Bolts

In March 2016, Entergy performed examinations of the Unit 2 reactor vessel internal components during 2RFO22 as part of scheduled license renewal activities and discovered a greater than expected amount of degraded baffle former bolts through visual and ultrasonic examinations. Entergy determined that the number and location of baffle former bolts did not meet the acceptance criteria provided in the pre-outage bolt pattern analysis to support plant startup, and as a result, Entergy reported this as an unanalyzed condition to the NRC as Event Notification 51829 on March 29, 2016. The inspectors performed inspections documented in Section 4OA2 of this report and in Section 4OA2 of NRC Inspection Report 05000247/2016002 (ML17089A245) as a follow-up to the event. The inspectors also reviewed piping analyses specific to Indian Point to verify assumptions made in the safety significance assessment of the as-found baffle former bolt condition at Unit 2. The inspectors did not identify any findings or violations of NRC requirements during the review of this LER. This LER is closed.

.3 (Closed) LER 05000247/2017-002-00: Auxiliary Feedwater Flow Indication Inoperable for Longer Than the Allowed Technical Specification Completion Time Due to Failure to Complete Restoration Following Calibration

On June 26, 2017, following a reactor trip, Entergy identified that the 22 SG AFW flow indicator (FI-1201) was inoperable. The flow indicator is used for post-accident monitoring to ensure adequate heat removal via the SG. The direct cause was due to I&C technicians tagging out the root valves, isolating the source of water, and thus preventing proper filling and venting of the transmitter (FI-1201). The apparent cause was poor communications. The status of the transmitter and the need to be filled and vented following tag-out removal was not logged or turned over to the on-coming operations shift in accordance with procedures. The inspectors reviewed Entergy's actions and reportability criteria associated with LER 05000274/2017-002-00, which was submitted to the NRC on August 24, 2017. The enforcement aspects of this issue are discussed in Section 4OA3.1 of this report. The inspectors did not identify any other issues during the review of the LER. This LER is closed.

.4 (Closed) LER 05000247/2017-003-00: Technical Specification Violation of Section 3.3.1 RPS Instrumentation

On June 27, 2017, during reactor startup, power was raised from Mode 3 to Mode 2 and above the P6 (intermediate range neutron flux) interlock with the P6 switches in the wrong position. The P6 interlock is used to block the source range high-flux trip when power level is above  $10^{-10}$  amps in the intermediate range detectors. The direct cause was due to I&C technicians not restoring test permissive intermediate range switches 1/N35D and 1/N36D to their proper position during surveillance testing as required by

procedure. The apparent cause was poor communications. The responsible supervisor and maintenance leadership did not provide sufficient oversight or guidance, and the test procedure 2-PT-V063A is not aligned with writer's guide best practices. The inspectors reviewed Entergy's actions and reportability criteria associated with LER 05000274/2017-003-00, which was submitted to the NRC on August 24, 2017. The enforcement aspects of this issue are discussed in Section 4OA3.1 of this report. The inspectors did not identify any other issues during the review of the LER. This LER is closed.

#### 4OA5 Other Activities (2 samples)

##### .1 Institute of Nuclear Power Operations (INPO) Operations Program Accreditation Report Review

###### a. Inspection Scope

The inspectors reviewed the final report for the INPO Operations Training Programs Accreditation of Units 2 and 3 conducted in July 2017. The inspectors reviewed the report to ensure that any issues identified were consistent with NRC perspectives of Entergy performance and to determine if INPO identified any significant safety issues that required further NRC follow-up.

###### b. Findings

No findings were identified.

##### .2 (Discussed) VIO 05000247/2016003-07: Inadequate Control of Floor Drains to Minimize Groundwater Contamination (EA-16-193)

On February 16, 2017, Entergy replied to Notice of Violation 05000247/2016003-07, Inadequate Control of Floor Drains to Minimize Groundwater Contamination. The corrective actions identified by Entergy included repairing the floor drain system and fuel storage building (FSB) sump pump 28 and inspecting and cleaning the floor drain systems in Units 2 and 3. Additionally, Entergy tested and placed in service recovery well 1 (RW-1) in the area of highest groundwater tritium concentration. Review of Entergy documentation indicates repairs to the FSB sump pump 28 were completed; however, the backflow inhibitor valve, present in the original drawings for the sump but never installed, has still not been installed. This activity is scheduled for the fourth quarter 2017. Also not scheduled until the fourth quarter 2017 is the installation of a permanent sealant in the FSB subfloor, which was the location for two of the 2016 groundwater leaks. Regarding inspection of the floor drains, Entergy records indicate that sixteen identified drains have not been examined due to a lack of access; and two floor drains could not be located in Unit 2. In Unit 3, seven identified drains have not been examined due to a lack of access; and one floor drain could not be located. Preventive maintenance activities have been created to periodically clean the floor drains, with a specified frequency of six years, which puts the next cleaning beyond the announced plant shutdown date. This item remains open pending completion of the backflow valve and FSB subfloor modifications, and the inspections for all remaining floor drains in the radiological controlled area at Units 2 and 3 (excluding those in the containment).

**4OA6 Meetings, Including Exit**

On October 20, 2017, the inspectors presented the inspection results to Mr. Anthony Vitale, Site Vice President, and other members of Entergy's staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

**ATTACHMENT: SUPPLEMENTARY INFORMATION**

## SUPPLEMENTARY INFORMATION

### KEY POINTS OF CONTACT

#### Entergy Personnel

##### Senior Managers

A. Vitale, Site Vice President  
J. Ferrick, General Manager, Plant Operations (current)  
J. Kirkpatrick, General Manager, Plant Operations (former)  
G. Bouderau, Senior Manager, Site Projects and Maintenance Services  
R. Burroni, Director, Special Projects  
D. Dewy, Senior Manager, Production  
V. Andreozzi, Director, Engineering  
M. Kempski, Senior Manager, Maintenance  
M. Lewis, Senior Manager, Operations  
B. McCarthy, Director, Regulatory Assurance and Performance Improvement Director

##### Other Personnel

R. Alexander, Shift Manager, Unit 2  
N. Azevedo, Supervisor, Engineering  
B. Blackburn, Unit 3 Shift Technical Advisor  
D. Candela, Nuclear Engineer  
T. Chan, Supervisor, Engineering  
A. Coletti, Senior Nuclear Mechanic  
D. Croulet, Senior Training Instructor  
G. Dahl, Licensing Specialist  
J. Dignam, Shift Manager, Unit 3  
A. DiNitto, Senior Scheduler  
B. Dolansky, Senior Programs Engineer  
C. Dolansky, Nuclear Engineer  
M. Fritz, Unit 3 Control Room Operator  
R. Gioggia, Senior Engineer  
J. Hill, Supervisor, Engineering  
M. Johnson, Manager, Unit 3 Assistant Operations  
M. Lewis, Unit 3 Control Room Operator  
C. Mackaman, Nuclear Safety/License Specialist  
M. Martin, Unit 3 Control Room Operator  
T. McKee, Operations Senior Nuclear Instructor  
F. Mitchell, Manager, Emergency Planning  
N. Martinez, Unit 3 Shift Manager  
J. Miu, Senior Engineer  
R. Montross, Unit 2 Shift Manager  
T. Murphy, Unit 3 Shift Manager  
W. O'Brien, Supervisor, Radiation Protection  
D. Panino, 89-13 Program Manger  
D. Powell, Supervisor, Unit 3 Control Room  
J. Ryan, Unit 3 Shift Manager  
S. Ryan, Supervisor, Unit 2 Control Room  
J. Sledzinski, Senior Nuclear Mechanic  
F. Spagnuolo, Manager, Outage  
R. Walpole, Manager, Regulatory Assurance

**LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED**Opened/Closed

05000247/2017-003-01	NCV	Component Misalignments for Nuclear Instrumentation P6 Permissive and AFW Flow Transmitter FI-1201 Following Scheduled Maintenance (Section 4OA3)
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Closed

05000247/2016-004-00	LER	Unanalyzed Condition Due to Degraded Reactor Baffle-Former Bolts (Section 4OA3)
05000247/2017-002-00	LER	Auxiliary Feedwater Flow Indication Inoperable for Longer Than the Allowed Technical Specification Completion Time Due to Failure to Complete Restoration Following Calibration (Section 4OA3)
05000247/2017-003-00	LER	Technical Specification Violation of Section 3.3.1 RPS Instrumentation (Section 4OA3)
05000247/2016-001-01	URI	Baffle Former Bolts with Identified Anomalies (Section 4OA2)

Discussed

05000247/2016-003-07	VIO	Inadequate Control of Floor Drains to Minimize Groundwater Contamination (Section 4OA5)
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## LIST OF DOCUMENTS REVIEWED

### Common Documents Used

Indian Point Unit 2, UFSAR  
 Indian Point Unit 2, Individual Plant Examination  
 Indian Point Unit 2, Individual Plant Examination of External Events  
 Indian Point Unit 2, TSs and Bases  
 Indian Point Unit 2, Technical Requirements Manual  
 Indian Point Unit 2, Control Room Narrative Logs  
 Indian Point Unit 2, Plan of the Day  
 Indian Point Unit 3, UFSAR  
 Indian Point Unit 3, Technical Requirements Manual  
 Indian Point Unit 3, Individual Plant Examination  
 Indian Point Unit 3, Individual Plant Examination of External Events

### Section 1R01: Adverse Weather Protection

#### Procedures

2-AOP-480V-1, Loss of Normal Power to Any 480V Bus, Revision 8  
 3-AOP-480V-1, Loss of Normal Power to Any Safeguards Equipment, Revision 7  
 IP-SMM-OP-104, Offsite Power Continuous Monitoring and Notification, Revision 13  
 IP-SMM-OU-104, Shutdown Risk Assessment, Revision 15

### Section 1R04: Equipment Alignment

#### Procedures

2-COL-21.3, SG Water Level, Revision 34  
 2-COL-27.3.1, Diesel Generators, Revision 26  
 2-COL-4.1.1, Component Cooling System, Revision 26  
 2-PC-EM11-3, No. 23 Auxiliary Feedwater Pump Run-Out Protection Instruments, Revision 11  
 2-PT-Q027B, 23 Auxiliary Feed Pump, Revision 19  
 3-COL-FW-2, Auxiliary Feedwater System, Revision 33

#### Condition Reports (CR-IP2-)

2017-02599

#### Condition Reports (CR-IP3-)

2017-02921    2017-03008    2017-04040

#### Maintenance Orders/Work Orders

WO 00482983            WO 52715166            WO 52760258            WO 52761420

#### Drawings

227781, Flow Diagram Auxiliary Cooling System, Revision 82  
 251129, Flow to SGs, Nos. 23 and 24, Loop Nos. 405 and 406, Revision 5  
 251131, Auxiliary Boiler Feed, Revision 16  
 9321-2028, Flow Diagram Jacket Water to Diesel Generators, Revision 37  
 9321-2029, Flow Diagram Starting Air to Diesel Generators, Revision 54  
 9321-2030, Flow Diagram Fuel Oil to Diesel Generators, Revision 40

#### Miscellaneous

2C23-1 CCW-019-21 ACCP-MTR  
 2C23-1 CCW-020-21 ACCP-755B

**Section 1R05: Fire Protection**

Procedures

0-PT-004, Fire Extinguisher Inspection, Revision 9  
EN-DC-161, Control of Combustibles, Revision 17  
IPEC Pre-Fire Plans, Revision 15  
PFP-251, Pre-Fire Plan for Control Building, 480 Volt Switchgear Room, 15-Foot Elevation, Revision 15  
PFP-252, Pre-Fire Plan for Control Building, Cable Spreading Room, 33-Foot Elevation, Revision 11  
PFP-258, Pre-Fire Plan for Diesel Generator Building/Electrical Tunnel Exhaust Fans, 72-Foot Elevation, Revision 5  
SAO-703, Fire Protection Impairment Criteria and Surveillance, Revision 35

Condition Reports (CR-IP2-)

2017-02383 2017-02974

Maintenance Orders/Work Orders

WO IPC-52477866

Miscellaneous

Indian Point Unit 3 Fire Hazards Analysis, Revision 5  
IPEC PFP 307  
IPEC PFP 307A  
IPEC PFP 351  
IPEC PFP 351A  
IPEC PFP 352  
IPEC PFP 352A  
IPEC PFP 353

**Section 1R06: Flood Protection Measures**

Condition Reports (CR-IP3-)

2017-00471 2017-02974 2017-03163 2017-03482

**Section 1R11: Licensed Operator Requalification Program**

Procedures

2-POP-1.2, Reactor Startup, Revision 59

**Section 1R12: Maintenance Effectiveness**

Condition Reports (CR-IP3-)

2013-00128 2013-01519 2014-02446 2015-01846 2015-01902 2017-01154  
2017-01276 2017-01808 2017-02277 2017-02408

Maintenance Orders/Work Orders

WO 00395893 WO 00402353 WO 00474124 WO 52263367  
WO 52263374

**Section 1R13: Maintenance Risk Assessments and Emergent Work Control**

Procedures

3-PT-R090D, Local Operation of 31 and 33 ABFPs, Revision 16  
EN-OP-119, Protected Equipment, Revision 8  
IP-SMM-WM-101, Fire Protection and Maintenance Rule (a)(4) Risk Assessment, Revision 5  
IP-SMM-OU-104 Attachment 9.2, Shutdown Risk Assessment, Revision 15

Maintenance Orders/Work Orders

WO 52637996

Miscellaneous

Equipment Out of Service Risk Assessment Software Tool

**Section 1R15: Operability Determinations and Functionality Assessments**

Procedures

2-PT-Q55, Pressurizer Pressure, Revision 6  
EN-DC-136, Temporary Modifications, Revision 14  
EN-LI-102, Corrective Action Program, Revision 27

Condition Reports (CR-IP2-)

2017-02807

Condition Reports (CR-IP3-)

2017-01577    2017-01731    2017-01737    2017-02084    2017-03225    2017-03515  
2017-03822    2017-04417    2017-04441

Work Orders

WO526537 17-01

Drawings

9321-2017, Main Steam, Revision 84  
9321-F-20333, Sheet 1, Flow Diagram Service Water System, Revision 59  
9321-F-20333, Sheet 2, Flow Diagram Service Water System, Revision 37

Miscellaneous

Critical Decision Paper, Repairs to PT-456 during 2P022A Outage  
Engineering Change Reply EC 69885  
LTR-NRC-16-82, Submittal of Proprietary and Non-Proprietary Versions of Three Topical Reports: WCAP-18174, Revision 0, WCAP-18175, Revision 0, and WCAP-18176, Revision 0, dated December 21, 2016  
MCOE-TR-16-18, Fractography of Indian Point Unit 2 Baffle Former Bolts, Revision 0, dated November 2016  
NL-17-061, Reply to Requests for Additional Information for the Review of the Indian Point License Renewal Application RAI SET 2017-04, dated May 24, 2017  
NYPA 451-100000596, Worthington Vendor Tech Manual for the 32 Auxiliary Feedwater Pump and Turbine  
Root Cause Evaluation titled Excessive Number of Baffle – Former Bolts Found with Indications During the 2R22 MRP – 227A Inspection (CR-IP2-2016-02348), Revision 1, dated May 20, 2016  
SEP-PVI-IPEC-001, IPEC PWR Vessel Internals Program, Revision 2



WCAP-18174-NP, Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for Indian Point Units 2 and 3, Using Leak-Before-Break Methodology, Revision 0

Calculations

FFX-00163-00, Evaluation of Seismic Adequacy of Piping and Support for SWN-49 Concal Replacement, Revision 0

FFX-00170-00, Qualification of Support Nos. 1590-HSR-001 and 1591-HSR-001 for Service Water Valves SWN-49 and SWN-49-1, Respectfully, for 150 Pounds Loading, Revision 0

IP-CALC-17-00035, Unit 3 Strainer Backwash Pipe Operability for Degraded Support SWN-49, Revision 0

**Section 1R17: Evaluation of Changes, Tests, or Experiments**

Procedures

EN-DC-115, Engineering Change Process, Revision 20

EN-DC-136, Temporary Modifications, Revision 13

EN-LI-100, Process Applicability Determination, Revision 20

EN-LI-101, 10 CFR 50.59 Evaluations, Revision 12

EN-WM-105, Planning, Revision 18

IP-SMM-AD-102, IPEC Implementing Procedure Preparation, Review and Approval, Revision 10

Condition Reports (CR-IP2-)

2012-04826 2014-06360 2016-06578 2016-07103 2017-01418

Condition Reports (CR-IP3-)

2017-00435 2017-01974

Audits and Assessments

LO-IP2LO-2016-00035, Focus Self-Assessment for Pre-NRC Inspection of Permanent Plant Modifications

Quality Assurance Audit Report QA-12/18-2015-IP-1, Operations/TSS

Quality Assurance Audit Report QA-4-2014-IP-1, Engineering (Design Control)

Quality Assurance Audit Report QA-5-2016-IP-1, Documents-Records

10 CFR 50.59 Evaluations

2015-3001-00-EVAL, TRS 3.8.A.2 Turbine Valve Testing, Revision 0

2015-3002-00-EVAL, EC 56516, Acoustic Monitoring System for Power Operated Relief Valve RC-PCV-455C, dated March 26, 2015

2016-2001-00-EVAL, EC 63282, Temporary Modification to Crab-in the Failed Reactor Protection Relay 15-B, Revision 0

2016-2002-00-EVAL, Unit 3 Temporary Short Term Use of Jumpers to Bypass Only the Over Temperature Delta T Channel During Surveillance Test, Revision 0

10 CFR 50.59 Screening Evaluations

Administrative Change EC 32938

DRN 14-01459: 3-SOP-AFW-0001, Auxiliary Feedwater System Operation, Revision 8

DRN 15-00018: 3-AOP-RHR-1, Loss of Residual Heat Removal, Revision 10

EC 50865, IP2 Install New Spent Fuel Pool Level instrumentation in Support of Fukushima NRC Order EA-12-051, Revision 0

EC 53505, IP2 EDG Cooler Rupture Disk Installation, Revision 0  
EC 53509, IP3 EDG Cooler Rupture Disk Installation, Revision 0  
EC 54598, Temporary Heating for IP3 Fire Water Storage Tank Piping, Revision 0  
EC 56516, Acoustic Monitoring System for Power Operated Relief Valves RC-PCV-455C and RC-PCV-456, Revision 0  
EC 57046, IP2 Install New Spent Fuel Pool Level instrumentation in Support of Fukushima NRC Order EA-12-051, Revision 0  
EC 57387, Temporary Cell for 31 Station Battery to Replace Existing Degraded Cell No. 59, Revision 0  
EC 59659, Provide Temporary Power to PAB Exhaust Fan 21 from MCC-29 Compartment 6H While MCC 26C Out of Service During Refueling Outage 2R22, Revision 0  
EC 70497, Shielding Evaluation for Residual Heat Removal Line No. 10 and AC-MOV-730  
EC 70673, Replace 138kV Bus Section 6 Primary and Backup Pilot Wire Auxiliary Potential Transformers, Revision 0  
EC 70747, Replacement of Polar Crane Fuses 38MCC-4J-F1, F2, and F3, Revision 0

Design & Licensing Bases

Indian Point 2, UFSAR, Revision 26  
Indian Point 2, TSs  
Indian Point 2, Technical Requirements Manual  
Indian Point 3, UFSAR, Revision 6  
Indian Point 3, TSs  
Indian Point 3, Technical Requirements Manual

**Section 1R18: Plant Modifications**

Procedures

2-SOP-21.1, Main Feedwater System, Revision 66  
SEP-SW-IPC-001, Indian Point Entergy Center NRC Generic Letter 89-13 Service Water Program, Revision 0

Condition Reports (CR-IP2-)

2017-03363    2017-03412    2017-03414    2017-03428    2017-03434    2017-03435

Condition Reports (CR-IP3-)

2016-02865

Maintenance Orders/Work Orders

WO 383354-9            WO 383354-10            WO 383354-11            WO 383354-12  
WO 383354-13            WO 383354-14            WO 458248

Miscellaneous

9321-F-2333 Sheet 1, Flow Diagram Service Water System, Revision 58  
EC 72950, Design Equivalency for Replacement of 21 and 22 MBFP Turbine Speed Control System Drivers "A", "B" and "C" Transmitter/Isolator Modules with Newer Lovejoy Designed Replacement Modules, Revision 0  
EC 68890, Design Equivalency for Replacement of 21 and 22 MBFP Driver Cards, Revision 01  
EC 74061, Clarify Design Equivalency for MBFP Driver Card Replacement, Revision 0  
EC 74094, Clarification of Acceptance Criteria for MBFP, Revision 0  
EC 45426, Refurbishment of U3 Intake Structure Degraded Steel and Concrete Structural Components Topic Notes, Revision 0

Entergy Letter N-16-122, Reply to Request for Additional Information for the Review of the Indian Point Nuclear Generating Units 2 and 3, License Renewal Application, SET 2016-01 (CAC Nos. MD5407 and MD5408, Docket Nos. 50-24 7 and 50-286, and License Nos. DPR-26 and DPR-64), dated December 2, 2016

IPEC 89-13 Inspection Results Database

IP-RPT-14-00022, External Lining for Safety Related Service Water Piping, dated October 10, 2014

NUREG 1802, Generic Aging Lessons Learned Report, Revision 2

NUREG 1930 Supplement 1, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Units 2 and 3, dated August 2011

NUREG 1930 Supplement 2, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Units 2 and 3, dated July 2015

NUREG 1930 Volumes 1 and 2, Safety Evaluation Report Related to the License Renewal of Indian Point Nuclear Generating Units 2 and 3, dated November 2009

### **Section 1R19: Post-Maintenance Testing**

#### Procedures

2-PT-M021C, Emergency Diesel Generator 23 Load Test, Revision 28

2-PT-M110, Appendix R DG Functional Test, Revision 9

2-SOP-27.3.1.3, 23 Emergency Diesel Generator Manual Operation, Revision 22

2-SOP-27.6, Unit 2 Appendix R Diesel Generator Operation, Revision 17

#### Condition Reports (CR-IP2-)

2017-02304 2017-02432 2017-03238

#### Maintenance Orders/Work Orders

WO 52568026 WO 52624551 WO 52677081

### **Section 1R20: Refueling and Other Outage Activities**

#### Procedures

2-POP-1.2, Reactor Startup, Revision 59

2-POP-3.1, Plant Shutdown from 45% Power, Revision 58

2-POP-3.2, Plant Recovery from Trip, Hot Standby, Revision 41

IP-SMM-WM-101, Fire Protection and Maintenance Rule (a)(4) Risk Assessment, Revision 5

### **Section 1R22: Surveillance Testing**

#### Procedures

2-PT-M110, Appendix R Diesel Generator Functional Test, Revision 9

2-SOP-27.6, Unit 2 Appendix R Diesel Generator Operation, Revision 17

3-PT-Q120A, 31 Auxiliary Feedwater Pump, Revision 17

3-PT-Q134A, 31 Residual Heat Removal Pump Functional Test (Residual Heat Removal Cooling Not in Service), Revision 10

#### Condition Reports (CR-IP2-)

2016-00641 2016-07212 2016-07328 2017-00253 2017-02432

#### Condition Reports (CR-IP3-)

2014-00575 2017-03960 2017-04015 2017-04073

Maintenance Orders/Work Orders

WO 52760258

**Section 1EP2: Alert and Notification System Evaluation**Procedures

IPEC Siren System Maintenance Manual, Acoustic Technology, Inc. (ATI)  
 IP-EP-AD-20, IPEC Alert Notification System Test, Revision 5  
 IP-EP-AD-31, IPEC ATI Siren System Maintenance Administration, Revision 3  
 IP-EP-AD32, IPEC ATI Siren System Routine Polling and Testing, Revision 5  
 IP-EP-AD-33, IPEC ATI Siren System Quarterly Preventative Maintenance, Revision 7  
 IP-EP-AD-34, IPEC ATI Control Station Semi-Annual Preventative Maintenance, Revision 5  
 IP-EP-AD-35, IPEC ANS Siren Annual Preventative Maintenance, Revision 6  
 IP-EP-AD-36, IPEC ATI Repeater Tower Semi-Annual Preventative Maintenance, Revision 5  
 IP-EP-AD-38, IPEC ATI Repeater Site Annual Preventative Maintenance, Revision 7  
 IP-EP-AD-39, IPEC ATI Control Station Annual Preventative Maintenance, Revision 5  
 IP-EP-AD-41, IPEC ATI Siren Site Annual Sample Preventative Maintenance, Revision 0

Maintenance Orders/Work Orders

WO 52573542	WO 52594527	WO 52598867	WO 52600120
WO 52602922	WO 52625521	WO 52632121	WO 52652539
WO 52659991	WO 52666695	WO 52673614	WO 52690784
WO 52696233	WO 52701161	WO 52706438	WO 52732270
WO 52733259	WO 52733938	WO 52734244	WO 52737065
WO 52742632			

Miscellaneous

ANS Design Report for IPEC, dated March 2010  
 ANS Maintenance Records, July 2015 to July 2017  
 ANS Test Records, July 2015 to July 2017

**Section 1EP3: Emergency Response Organization Staffing and Augmentation System**Procedures

EN-TQ-110, Emergency Response Organization Training, Revision 12  
 EN-TQ-110-01, Fleet Emergency Plan Training Course Summary, Revision 3

Miscellaneous

IPEC-EP, IPEC Emergency Plan, Revision 19  
 IPEC ERO Off-Hours Tally Sheet for First Quarter 2017, Third Quarter 2016, Fourth Quarter 2015

**Section 1EP5: Maintenance of Emergency Preparedness**Procedures

2-AOP-SSD-1, Control Room Inaccessibility Safe Shutdown Control, Revision 24  
 EN-EP-305, Emergency Planning 10 CFR 50.54(q) Review Program, Revision 5  
 IP-EP-AD40, Equipment Important to Emergency Response, Revision 10

Condition Reports (CR-IP2-)

2015-02967	2015-03128	2015-03659	2015-03749	2015-03749	2015-04809
2015-05162	2015-05292	2016-00729	2016-02992	2016-03368	2016-04264

2016-04704 2016-07023 2017-00659 2017-00673 2017-02403\* 2017-02422\*  
2017-02436\* 2017-02437\*

\*Denotes results from NRC inspection

Condition Reports (CR-IP3-)

2016-00252 2017-02443

Miscellaneous

IPEC Emergency Plan, Revision 19  
KLD TR-801, IPEC 2015 Population Update Analysis  
KLD TR-858, IPEC 2016 Population Update Analysis  
Letters of Agreement, as described in Appendix 2 of the IPEC Emergency Plan

Audits and Self-Assessments

IPEC Actual Event Report, Notification of Unusual Event on November 8, 2016  
Pre-NRC Program Inspection Assessment  
QA-7-2017-IP-1, Quality Assurance Audit Report  
QA-7-2106-IP-1, Quality Assurance Audit Report  
Report, IPEC Team Alpha Emergency Planning Exercise on June 28, 2016  
Report, IPEC Team Bravo Emergency Planning Drill on January 20, 2016  
Report, IPEC Team Charlie Emergency Planning Drill on November 30, 2016  
Report, IPEC Team Delta Emergency Planning Drill on January 25, 2017

**Section 2RS2: Occupational ALARA Planning and Controls**

Miscellaneous

Indian Point Unit 3 3R19 Outage Summary Report

**Section 4OA1: Performance Indicator Verification**

Procedures

EN-FAP-EP-005, Emergency Preparedness Performance Indicators, Revision 6  
IP-RPT-14-00015, Mitigating Systems Performance Index Basis Document, Revision 2  
IP-RPT-14-00015, Mitigating Systems Performance Index Basis Document, Revision 3  
IP-RPT-16-00061, Indian Point Unit 2 Probabilistic Safety Assessment, Revision 0

Condition Reports (CR-IP2-)

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Condition Reports (CR-IP3-)

2017-04222 2017-04268\*

\*Denotes results from NRC inspection

Miscellaneous

ANS Reliability PI Data, April 2016 to June 2017  
DEP PI Data, April 2016 to June 2017  
ERO Drill Participation PI Data, April 2016 to June 2017

**Section 40A2: Problem Identification and Resolution**Procedures

2-REF-002-GEN, Section 2.10, Reactor Vessel Head O-ring Replacement, Revision 4 and 6  
 2-REF-002-GEN, Section 3.4, Reactor Vessel Head Installation, Revision 5  
 3-MD-58, Control and Issue of Calibrated and M&TE, Revision 3  
 3-REF-002-GEN, Section 2.10, Reactor Vessel Head O-ring Replacement, Revision 3, 4 and 6  
 3-REF-002-GEN, Section 3.4, Reactor Vessel Head Installation, Revision 5  
 AP-17, Calibration of M&TE, Revision 6  
 CQCP-6E, M&TE Control Procedure, Revision 1  
 EN-DC-106, Temporary Installation of M&TE, Revision 0  
 EN-HU-106, Procedure and Work Instruction Use and Adherence, Revision 3  
 EN-LI-102, Corrective Action Program, Revision 27  
 EN-LI-118, Cause Evaluation Process, Revision 24  
 EN-MA-105, Control of M&TE, Revision 13  
 GQP-12.0, Control of M&TE, Revision 20  
 IP-SMM-MA-115, IPEC Calibration and Control of M&TE, Revision 2  
 RVI-004-GEN, Reactor Vessel Head O-ring Replacement, Revision 1  
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2003-05664    2014-03809    2016-02081    2016-02348    2016-06882    2017-02293

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1995-01131    1995-01223    2003-03168    2005-01479    2009-02407    2015-01211  
 2015-03845    2015-04852    2017-01577    2017-03094    2017-03389

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 MCOE-TR-16-18, Fractography of Indian Point Unit 2 Baffle Former Bolts, Revision 0, dated November 2016  
 NL-17-061, Reply to Requests for Additional Information for the Review of the Indian Point License Renewal Application RAI SET 2017-04, dated May 24, 2017  
 Root Cause Evaluation titled Excessive Number of Baffle – Former Bolts Found with Indications During the 2R22 MRP – 227A Inspection (CR-IP2-2016-02348), Revision 1, dated May 20, 2016  
 SEP-PVI-IPEC-001, IPEC PWR Vessel Internals Program, Revision 2

**Section 40A3: Follow-up of Events and Notices of Enforcement Discretion**Miscellaneous

LER 05000247/2017-002-00, Auxiliary Feedwater Flow Indication Inoperable for Longer Than the Allowed Technical Specification Completion Time Due to Failure to Complete Restoration Following Calibration  
 LER 05000247/2017-003-00, Technical Specification Violation of Section 3.3.1 RPS Instrumentation

LTR-NRC-16-82, Submittal of Proprietary and Non-Proprietary Versions of Three Topical Reports: WCAP-18174, Revision 0, WCAP-18175, Revision 0, and WCAP-18176, Revision 0, dated December 21, 2016

LTR-PL-16-23, Indian Point 2 Baffle Bolts - Assessment of Potential Safety Impacts, dated May 26, 2016

WCAP-18174-NP, Technical Justification for Eliminating Pressurizer Surge Line Rupture as the Structural Design Basis for Indian Point Units 2 and 3, Using Leak-Before-Break Methodology, Revision 0

WCAP-18175-NP, Technical Justification for Eliminating Residual Heat Removal Line Rupture as the Structural Design Basis for Indian Point Units 2 and 3, Using Leak-Before-Break Methodology, Revision 0

WCAP-18176-NP, Technical Justification for Eliminating Accumulator Line Rupture as the Structural Design Basis for Indian Point Units 2 and 3, Using Leak-Before-Break Methodology, Revision 0

#### **Section 40A5: Other Activities**

Condition Reports (CR-IP2-)  
2016-05814

#### Miscellaneous

Hennigan Engineering Company, Inc., 2016 Groundwater Project Report Units 2 and 3 Floor Drains Flow Verification and Current Condition, June 2016

Hennigan Engineering Company, Inc., Report on Floor Drain Cleaning in the Unit 2 Primary Auxiliary Building, March 2016

**LIST OF ACRONYMS**

10 CFR	Title 10 of the <i>Code of Federal Regulations</i>
ABFP	auxiliary boiler feedwater pump
AC	alternating current
AFW	auxiliary feedwater
ALARA	as low as is reasonably achievable
ANS	alert and notification system
ANSI	American National Standards Institute
AVR	automatic voltage regulator
CAP	corrective action program
CR	condition report
EC	equivalent change
EDG	emergency diesel generator
EP	emergency preparedness
ERF	emergency response facility
ERO	emergency response organization
FSB	fuel storage building
IASCC	irradiation-assisted stress corrosion cracking
I&C	Instrumentation and Control
IG	intergranular
IMC	Inspection Manual Chapter
kV	kilovolt
LER	licensee event report
MBFP	main boiler feed pump
M&TE	measuring and testing equipment
NCV	non-cited violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission, U.S.
PFP	pre-fire plan
PI	performance indicator
RCS	reactor coolant system
RPS	reactor protection system
SCBA	self-contained breathing apparatus
SG	steam generator
SSC	structure, system, and component
TS	technical specification
UFSAR	updated final safety evaluation report
URI	unresolved item
WO	work order