



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
2443 WARRENVILLE RD. SUITE 210
LISLE, ILLINOIS 60532-4352

April 18, 2018

Mr. Bryan C. Hanson
Senior VP, Exelon Generation Company, LLC
President and CNO, Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

**SUBJECT: CLINTON POWER STATION—NRC INTEGRATED INSPECTION REPORT
05000461/2018001**

Dear Mr. Hanson:

On March 31, 2018, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Clinton Power Station. On April 12, 2018, the NRC inspectors discussed the results of this inspection with Mr. T. Stoner and other members of your staff. The results of this inspection are documented in the enclosed report.

Based on the results of this inspection, the NRC has identified two issues that were evaluated under the risk significance determination process as having very-low safety significance (Green). The NRC has also determined that one violation is associated with these issues. Because the licensee initiated condition reports to address this issue, this violation is being treated as a Non-Cited Violation (NCV), consistent with Section 2.3.2 of the Enforcement Policy. The NCV is described in the subject inspection report.

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement; and the NRC Resident Inspector at the Clinton Power Station.

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 III; and the NRC resident inspector at Clinton Power Station.

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 at the NRC Public Document Room in accordance with 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Karla Stodter, Chief
Branch 1
Division of Reactor Projects

Docket No. 50-461
License No. NPF-62

Enclosure:
Inspection Report 05000461/2018001

cc: Distribution via LISTSERV®

Letter to Bryan Hanson from Karla Stoedter dated April 18, 2018

SUBJECT: CLINTON POWER STATION—NRC INTEGRATED INSPECTION REPORT
05000461/2018001

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket Numbers: 50-461

License Numbers: NPF-62

Report Numbers: 05000461/2018001

Enterprise Identifier: I-2018-001-0033

Licensee: Exelon Generation Company, LLC

Facility: Clinton Power Station

Location: Clinton, IL

Dates: January 1 through March 31, 2018

Inspectors: W. Schaup, Senior Resident Inspector
E. Sanchez Santiago, Senior Resident Inspector
L. Rodriguez, Acting Resident Inspector
C. Phillips, Project Engineer
S. Mischke, Resident Inspector,
Illinois Emergency Management Agency

Approved by: K. Stoedter, Chief
Branch 1
Division of Reactor Projects

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee’s performance by conducting an integrated quarterly inspection at Clinton Power Station, Unit 1 in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC’s program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information. The NRC and self-revealed findings, violations, and additional items are summarized in the table below.

List of Findings and Violations

Failure to Follow Procedure Results in Unplanned Reactor Core Isolation Cooling Unavailability			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000461/2018001-01 Closed	[H.3] – Teamwork	71111.22 – Surveillance Testing
<p>A self-revealed Green finding and associated Non-Cited Violation of Title 10 of the <i>Code of Federal Regulations</i> (CFR) Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings,” was identified when the licensee failed to follow station procedure Clinton Power Station (CPS) 9030.01C034, “RCIC [Reactor Core Isolation Cooling] Steam Line Flow E31-N683A(B), E31-N684A(B), Checklist.” Specifically, the licensee failed to reset the isolation logic for the RCIC steam line outboard isolation valve prior to turning on the breaker for this valve. This resulted in the isolation of the steam supply to RCIC causing RCIC to become unavailable, and elevating the plant risk to Yellow.</p>			

Failure to Identify a Single Point Vulnerability Results in Manual Reactor Scram			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Initiating Events	Green FIN 05000461/2018001-02 Closed	None	71153 – Follow-Up of Events and Notices of Enforcement Discretion
<p>A self-revealed Green finding was identified for the licensee’s failure to identify a single point vulnerability in accordance with procedure ER-AA-2004, Revision 1. Specifically, during a site single point vulnerability review of the feedwater system, the licensee failed to identify a single point vulnerability that subsequently resulted in a loss of a feedwater heating string. The loss of the heater string caused a drop in temperature in the reactor of 100 degrees which prompted a manual scram be initiated by the operators.</p>			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000461/2017-007-00	Manual Reactor Scram Due to Loss of Feedwater Heating	71153	Closed
LER	05000461/2017-007-01	Manual Reactor Scram Due to Loss of Feedwater Heating	71153	Closed
LER	05000461/2017-008-00	Division 3 Shutdown Service Water Pump Start Failure	71153	Closed
LER	05000461/2017-009-00	Trip of Emergency Reserve Auxiliary Transformer VAR Compensator Causes Positive Secondary Containment Pressure Following Voltage Transient on 138 kV Offsite Source	71153	Closed

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PLANT STATUS

Unit 1 began the inspection period at fully achievable thermal power. On February 25, 2018, the licensee reduced reactor power to approximately 85 percent to support control rod pattern adjustments. The unit returned to full power the same day. On March 11, 2018, the licensee reduced reactor power to approximately 75 percent to perform end-of-cycle control rod pattern adjustments and perform quarterly surveillances on control rods, main steam isolation valves, turbine stop valves/combined intermediate valves, and turbine control valves. The unit returned to full power the same day and remained at or near rated thermal power for the remainder of the inspection period.

INSPECTION SCOPES

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

REACTOR SAFETY

71111.04—Equipment Alignment

Partial Walkdown (4 Samples)

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

- (1) Division 2 Diesel Generator (DG) during Division 1 DG maintenance;
- (2) Fuel Pool Cooling and Cleanup Train 'B';
- (3) Reactor Core Isolation Cooling System (RCIC) during High Pressure Coolant Spray (HPCS) system outage window (SOW); and
- (4) Residual Heat Removal (RHR) 'A' during RHR 'B' SOW.

Complete Walkdown (1 Sample)

- (1) The inspectors evaluated system configurations during a complete walkdown of the HPCS system on March 29, 2018.

71111.05AQ—Fire Protection Annual/Quarterly

Quarterly Inspection (5 Samples)

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

- (1) Fire Zone A-5, Division 2 Battery Room—Elevation 781'-0";
- (2) Fire Zone D-7, D-8, D-9, Division 1, 2 and 3 DG Heating, Ventilation, and Air Conditioning Room—Elevation 762'-0";
- (3) Fire Zone F-1b, HPCS Pump Room—Elevation 712'-0";
- (4) Fire Zone F-1n, Fuel Pool Heat Exchanger (HX) Room—Elevation 737'-0"; and
- (5) Fire Zone F-1p, Fuel Pools and General Access—Elevation 755'-0".

71111.07—Heat Sink Performance

Heat Sink (1 Sample)

The inspectors evaluated the Division 3 DG jacket water heat exchanger performance on March 16, 2018.

71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

Operator Requalification (1 Sample)

The inspectors observed and evaluated an out-of-the-box evaluated exercise on February 8, 2018.

Operator Performance (1 Sample)

The inspectors observed and evaluated a downpower for rod pattern adjustments on February 26, 2018.

71111.12—Maintenance Effectiveness

Routine Maintenance Effectiveness (2 Samples)

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

- (1) Reactor Recirculation System; and
- (2) Standby Gas Treatment System.

71111.13—Maintenance Risk Assessments and Emergent Work Control (5 Samples)

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

- (1) Planned yellow due to RCIC SOW;
- (2) Unplanned yellow due to RCIC unavailable;
- (3) Planned yellow due to HPCS SOW;
- (4) Planned yellow due to remote shutdown panel maintenance; and
- (5) Planned yellow due to emergency diesel generator ventilation SOW.

71111.15—Operability Determinations and Functionality Assessments (6 Samples)

The inspectors evaluated the following operability determinations and functionality assessments:

- (1) AR 4100394: 1B21N095A—OOTS Finds Data OOS;
- (2) AR 4086972: Could Not Bleed Air Off 1SX041A Per 3211.01C003;
- (3) AR 4098585: 1TITV002 Reading Inaccurate, Needs Calibration;
- (4) AR 4084198: Invalid Charcoal Bypass Leak Test on 0VC09SB;
- (5) AR 4100662: Unexpected Annunciator for Fuel Building High Differential Pressure; and
- (6) AR 4096084: Scram Discharge Volume Drain and Vent Valves Time Delay in the Opening Direction Did Not Meet the Required Time Per CPS 9012.001D001.

71111.19—Post Maintenance Testing (6 Samples)

The inspectors evaluated the following post maintenance tests:

- (1) Testing of molded case circuit breaker 1E12F048A for RHR HX 1A shell side bypass valve 1E12F048A;
- (2) Testing of Division 3 Switchgear Ventilation System after maintenance;
- (3) Testing of the Division 3 DG after 2-year maintenance;
- (4) Testing of the Division 2 DG motor operated potentiometer after replacement;
- (5) Testing of Division 3 DG sub components (relays and motor operated potentiometer) after maintenance; and
- (6) Testing of the feedwater regulator valve (FW004) after maintenance.

71111.22—Surveillance Testing

The inspectors evaluated the following surveillance tests:

Routine (3 Samples)

- (1) Clinton Power Station (CPS) 9333.20: Division 1 4.16 kV Bus Undervoltage Relay (Degraded Voltage) Functional Test;
- (2) CPS 9080.03: Diesel Generator 1C Operability—Manual And Quick Start Operability; and
- (3) CPS 9030.01C034: RCIC Steam Line Flow E31–N683A(B), E31–N684A(B) Checklist.

In-service (1 Sample)

- (1) CPS 9051.01: High Pressure Core Spray Pump and HPCS Water Leg Pump Operability

71114.06—Drill Evaluation

Emergency Planning Drill (1 Sample)

The inspectors evaluated a full scale drill w/simulator Crew A on March 20, 2018.

OTHER ACTIVITIES – BASELINE

71151—Performance Indicator Verification (3 Samples)

The inspectors verified licensee performance indicator submittals listed below:

- (1) IE01: Unplanned Scrams per 7000 Critical Hours – 1 Sample (01/01/2017–12/31/2017);
- (2) IE03: Unplanned Power Changes per 7000 Critical Hours – 1 Sample (01/01/2017–12/31/2017); and
- (3) IE04: Unplanned Scrams with Complications – 1 Sample (01/01/2017–12/31/2017).

71152—Problem Identification and Resolution

Annual Follow-Up of Selected Issues (2 Samples)

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

- (1) AR 4082500: Turbine Driven Reactor Feedwater Pump (TDRFP) Failed to Trip; and
- (2) AR 4041047: 1VY06C RHR Pump Room ‘B’ Supply Fan Tripped.

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

Licensee Event Reports (4 Samples)

The inspectors evaluated the following licensee event reports which can be accessed at <https://lersearch.inl.gov/LERSearchCriteria.aspx>:

- (1) Licensee Event Report (LER) 05000461/2017–007–00, Manual Reactor Scram Due to Loss of Feedwater Heating;
- (2) LER 05000461/2017–007–01, Manual Reactor Scram Due to Loss of Feedwater Heating;
- (3) LER 05000461/2017–008–00, Division 3 Shutdown Service Water Pump Start Failure. This event was the subject of a previously documented violation and associated finding of low-to-moderate (White) significance (VIO 05000461/2017011–01) opened in NRC Inspection Report 05000461/2017011 (ML 18026A965) and finalized in NRC Inspection Report 05000461/2018091 (ML 18053A851); and
- (4) LER 05000461/2017–009–00, Trip of Emergency Reserve Auxiliary Transformer VAR Compensator Causes Positive Secondary Containment Pressure Following Voltage Transient on 138 kV Offsite Source.

INSPECTION RESULTS

71111.22—Surveillance Testing

Failure to Follow Procedure Results in Unplanned Reactor Core Isolation Cooling Unavailability			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Mitigating Systems	Green NCV 050000461/2018001–01 Closed	[H.3] – Teamwork	71111.22 – Surveillance Testing
<p>A self-revealed Green finding and associated Non-Cited Violation (NCV) of Title 10 of the <i>Code of Federal Regulations</i> (CFR) Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings,” was identified when the licensee failed to follow station procedure CPS 9030.01C034, “RCIC [Reactor Core Isolation Cooling] Steam Line Flow E31–N683A(B), E31–N684A(B), Checklist.” Specifically, the licensee failed to reset the isolation logic for the RCIC steam line outboard isolation valve prior to turning on the breaker for this valve. This resulted in the isolation of the steam supply to RCIC causing RCIC to become unavailable and elevating plant risk to yellow.</p>			
<p><u>Description:</u></p> <p>On January 24, 2018, during performance of the RCIC steam line flow and steam line pressure functional surveillances, an equipment operator closed the RCIC steam line outboard isolation valve breaker with the RCIC isolation signal still present from the channel functional. The presence of the isolation signal and subsequent shutting of the breaker caused the RCIC steam line outboard isolation valve to close automatically, rendering RCIC unavailable, and resulting in an unplanned change in plant risk from green to yellow.</p> <p>Procedure CPS 9030.01C034, “RCIC Steam Line Flow E31–N683A(B), E31–N684A(B), Checklist,” was a safety-related continuous use procedure. Per HU–AA–104–101, “Procedure Use And Adherence,” Revision 5, Section 2.4.1, for continuous use procedures, the steps are required to be performed in the sequence specified and completed before proceeding to the next step. Procedure CPS 9030.01C034, Step 8.4.9.1 stated, “Momentarily place Div 1(2) Isolation Reset Button switch in reset, return switch to normal and verify seal-in light not lit.” Step 8.4.9.2 stated, “At AB MCC 1A3–8C (1AP74E), shut breaker for 1E51–F064, RCIC Steam Line Outboard Isolation Valve.” The licensee performed Step 8.4.9.2 prior to performing Step 8.4.9.1, contrary to the requirements for continuous use procedures, which resulted in the configuration control event.</p> <p>The license performed Corrective Action Program Evaluation (CAPE) 04096509 and determined the cause of the issue was the failure to recognize and employ appropriate human performance error prevention tools. The licensee also determined there was a failure to communicate effectively between the control room operator and the equipment operator in the field. This resulted in the equipment operator taking actions in the field prior to verifying with the control room operator that the previous step had already been performed.</p> <p>Corrective Actions: The licensee restored RCIC to operable and available 1 hour and 20 minutes after it was rendered unavailable. The licensee also performed a CAPE, and the corrective actions created to address the identified cause included a discussion between</p>			

the shift managers and respective crews on the importance of human performance error prevention tools and how they could have been applied to prevent this event. They also required all on shift personnel to perform a read and sign of various procedures relating to: (1) human performance; (2) verification practices; and (3) procedure use and place keeping.

Corrective Action Reference: Action Request 04096509, "RCIC PCIV 1E51-F064 Isolated during CPS 9030.01 Surveillance"

Performance Assessment:

Performance Deficiency: The licensee failed to perform an activity affecting quality in accordance with prescribed procedure CPS 9030.01C034 as required by 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures and Drawings." Specifically, the licensee failed to reset the isolation logic for the RCIC steam line outboard isolation valve prior to turning on the breaker for this valve. Procedure CPS 9030.01C034 was a continuous use procedure which required the steps to be performed in sequence, and the licensee performed Step 8.4.9.2 prior to performing Step 8.4.9.1. This resulted in the isolation of the RCIC steam line outboard isolation valve, rendering RCIC unavailable.

Screening: The inspectors determined the performance deficiency was more than minor because it adversely affected the configuration control attribute of the Mitigating Systems Cornerstone and its objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the failure to follow station procedure 9030.01C034 resulted in unplanned RCIC unavailability.

Significance: The finding affected the Mitigating Systems Cornerstone and was screened in accordance with IMC 0609, Appendix A, "The Significance Determination Process (SDP) for Findings At-Power," Exhibit 2. The inspectors determined the finding represented a loss of system because RCIC is a single train system and therefore would require a detailed risk evaluation. The NRC simplified plant analysis risk model for Clinton was used for the analysis of the degraded condition caused by the performance deficiency. A condition assessment was completed using SAPHIRE where the RCIC turbine driven pump was considered non-functional for 2 hours which was rounded up from the actual exposure time of 1 hour and 20 minutes. The detailed risk evaluation determined the increase in core damage frequency for this condition was $1.66E-9$; therefore, this condition represented a Green finding of very low safety significance. The dominant sequence evaluated was a grid related loss of offsite power, sequence 40-30, which was a station blackout sequence.

Cross-cutting Aspect: The finding had a cross-cutting aspect in the Teamwork component of the Human Performance cross-cutting area, which states that individuals and work groups communicate and coordinate their activities within and across organizational boundaries to ensure nuclear safety is maintained. Specifically, the operators manipulating the breaker in the field failed to communicate with the operators in the control room resulting in the procedure steps being performed out of order. (H.3)

Enforcement:

Violation: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality be prescribed by documented procedures of a type appropriate to the circumstances and be accomplished in accordance with these procedures. The licensee established CPS 9030.01C034, "RCIC Steam Line Flow E31-N683A(B), E31-N684A(B), Checklist," Revision 32e, as the implementing

procedure for performing Technical Specification required surveillances on RCIC primary containment isolation valves.

Procedure CPS 9030.01C034, Step 8.4.9, stated, "If Breakers were opened for test, then perform the following after testing the last channel in division: (1) Momentarily place RCIC DIV 1/2 isolation reset switch in reset, return to norm and verify seal-in light not lit; and (2) at AB MCC 1A3–8C shut breaker for 1E51–F063, RCIC steam line outboard isolation valve."

Contrary to the above, on January 24, 2018, the licensee failed to follow Step 8.4.9.1 of procedure CPS 9030.01C034. Specifically, the licensee failed to place the isolation reset switch in reset prior to shutting the breaker for the RCIC steam line outboard isolation valve, causing the valve to close and rendering RCIC unavailable.

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

71152—Problem Identification and Resolution

Observations—Selected Issue Follow-Up for AR 4082500: TDRFP Failed to Trip; and AR 4041047: 1VY06C RHR Pump Room 'B' Supply Fan Tripped.	IP 71152
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As appropriate, the inspectors verified the following attributes during their review of the licensee's corrective actions for the above condition reports and other related condition reports:

- complete and accurate identification of the problem in a timely manner commensurate with its safety significance and ease of discovery;
- consideration of the extent of condition, generic implications, common cause, and previous occurrences;
- evaluation and disposition of operability/functionality/reportability issues;
- classification and prioritization of the resolution of the problem commensurate with safety significance;
- identification of corrective actions, which were appropriately focused to correct the problem; and
- completion of corrective actions in a timely manner commensurate with the safety significance of the issue.

The inspectors discussed the corrective actions and associated evaluations with licensee personnel.

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

Failure to Identify a Single Point Vulnerability Results in Manual Reactor Scram			
Cornerstone	Significance	Cross-cutting Aspect	Report Section
Initiating Events	Green FIN 05000461/2018001-02 Closed	None	71153 – Follow-Up of Events and Notices of Enforcement Discretion
<p>A self-revealed Green finding was identified for the licensee’s failure to identify a single point vulnerability in accordance with procedure ER-AA-2004, Revision 1. Specifically, during a site single point vulnerability (SSPV) review of the feedwater system, the licensee failed to identify a single point vulnerability that subsequently resulted in the loss of a feedwater heating string. This caused a drop in temperature in the reactor of 100 degrees which prompted a manual scram to be initiated by the operators.</p>			
<p><u>Description:</u></p> <p>On June 10, 2017, Clinton Power Station experienced a complete loss of the ‘A’ feedwater heater string. The temperature drop resulting from this event was greater than 100 degrees Fahrenheit. As directed by off-normal procedure CPS 4005.01, “Loss of Feedwater Heating,” Step 4.3, the operators turned the mode switch to shutdown. Subsequent troubleshooting identified the loss of the ‘A’ string of feedwater heating was due to a fuse opening in response to a shorted condition in one of the Moore trip units. The licensee performed a root cause evaluation to identify the cause of the issue. The identified root cause was that the design of the feedwater heater level control trip circuitry was not adequate to prevent scrams due to an unevaluated single point vulnerability.</p> <p>The licensee had previously performed multiple feedwater system reviews to identify single point vulnerabilities or issues that could impact equipment reliability. These reviews ranged in scope and were performed from 2002 through 2016. Most of the reviews excluded passive components, such as fuses, from their scope; the 2002 SSPV review was the exception. The 2002 SSPV review was performed in accordance with procedure ER-AA-2004, “System Vulnerability Review Process,” Revision 1, which stated in Section 4.2.5, “Perform a detailed review for each selected system. The review shall be of sufficient detail to uncover items that could lead to a scram or derate event.” In addition, the 2002 SSPV review expectations developed specifically for the feedwater system included the following clarification, “The intent is to identify single failure vulnerabilities that can result in any scram. The system engineer does not have to assume failure modes, but rather the impact of the component failing on the plant.” To aid the reviewer in identifying vulnerabilities, the licensee provided an example of a blown fuse at another boiling water reactor which resulted in a feedwater system power supply failure and a reactor scram. This example was very similar to the failure that resulted in the June 10, 2017, manual reactor scram at Clinton.</p> <p>The inspectors reviewed the scope of each SSPV review performed by the licensee and what information was available at the time and determined the licensee had enough information to identify the single point vulnerability discussed above during their 2002 SSPV review. If the licensee had identified the single point vulnerability in 2002 and taken the actions stated in the procedure, the June 10, 2017, reactor scram would have been prevented.</p>			

Corrective Actions: The immediate actions taken in response to the equipment deficiency was to install temporary cooling to prevent the Moore trip units from failing and causing the fuse to open. In response to the failure to identify the single point vulnerability, the corrective actions planned were to: (1) install a design change that would eliminate the identified single point vulnerability in the feedwater system; and (2) develop an engineering evaluation to identify any additional single point vulnerabilities in the feedwater system. The licensee also performed a self-assessment where they determined the need to perform a review of other systems to identify other unmitigated or unidentified single point vulnerabilities.

Corrective Action References: Action Request 4020569, "Manual Reactor Scram due to Loss of Feedwater Heating"

Performance Assessment:

Performance Deficiency: The licensee failed to identify a single point vulnerability in the feedwater system in accordance with site procedure ER-AA-2004, "System Vulnerability Review Process," Revision 1, Section 4.2.5, which stated, "Perform a detailed review for each selected system. The review shall be of sufficient detail to uncover items that could lead to a scram or derate event." Specifically, during a SSPV review of the feedwater system, the licensee failed to identify a single point vulnerability that subsequently resulted in a loss of a feedwater heating string. This caused a rise in temperature in the reactor of 100 degrees which prompted a manual scram to be initiated by the operators.

Screening: The inspectors determined the performance deficiency was more than minor because it adversely affected the design control attribute of the Initiating Events Cornerstone to limit the likelihood of events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Specifically, the failure to identify a single point vulnerability in the feedwater system resulted in a loss of a string of feedwater heating requiring a manual reactor scram.

Significance: The finding affected the Initiating Events Cornerstone and was screened in accordance with IMC 0609, Appendix A, "The Significance Determination Process for Findings At-Power," Exhibit 1, Section B, "Transient Initiators." The inspectors determined that although the finding resulted in a reactor trip, it did not result in the loss of mitigation equipment relied upon to transition the plant from the onset of the trip to a stable shutdown condition. Therefore, the finding screened as having very low safety significance (Green).

Cross-cutting Aspect: No cross-cutting aspect was assigned because the inspectors determined the finding did not reflect present licensee performance.

Enforcement:

The inspectors did not identify a violation of regulatory requirements associated with this finding. The procedure the licensee failed to follow was a self-imposed standard associated with non-safety related equipment and was not a regulatory requirement.

EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure. No proprietary information was documented in this report.

- On April 12, 2018, the inspector presented the quarterly integrated inspection results to Mr. T. Stoner, and other members of the licensee staff.

DOCUMENTS REVIEWED

71111.04—Equipment Alignment

- AR 00562705; 1E22: Testable Lever Found Set Wrong
- AR 04123592; NRC Question on ECCS Valve Line-up for 1E22-F304
- CPS 3309.01; High Pressure Core Spray (HPCS); Revision 17a
- CPS 3309.01E001; High Pressure Core Spray Electrical Lineup; Revision 8a
- CPS 3309.01H001; HPCS Manual Initiation - Shutdown Hard Card; Revision 0
- CPS 3309.01V001; High Pressure Core Spray Valve Lineup; Revision 11b
- CPS 3309.01V002; High Pressure Core Spray Instrument Valve Lineup; Revision 9
- CPS 3506.01V001; Division 2: Diesel Generator and Support Systems Valve Lineup; Revision 13A
- CPS 3506.01E001; Division 2: Diesel Generator and Support Systems Electrical Lineup; Revision 18c
- CPS 3506.01V002; Diesel Generator and Support Systems Instrument Valve Lineup; Revision 11b
- CPS 3317.01V001; Fuel Pool Cooling and Cleanup Valve Lineup; Revision 12a
- CPS 3317.01E001; Fuel Pool Cooling and Cleanup Electrical Lineup; Revision 13c
- CPS 3317.01V002; FPCC Instrument Valve Lineup; Revision 7
- CPS 3310.01V001; Reactor Core Isolation Cooling Valve Lineup; Revision 12e
- CPS 3310.01V002; Reactor Core Isolation Cooling Instrument Valve Lineup; Revision 9e
- CPS 3310.01E001; Reactor Core Isolation Cooling Electrical Lineup; Revision 16
- CPS 3310.01; Reactor Core Isolation Cooling (RI); Revision 30
- EC 400085; Retire Namco Limit Switches 1E12F301A/B/C, 1E22F304 and 1E21F340; Revision 0
- Dwg M05-1074; P&ID High Pressure Core Spray (HP), Sheet 001; Revision AH

71111.05AQ—Fire Protection Annual/Quarterly

- CPS 1893.04M410; 737 Fuel: Grade Level Prefire Plan; Revision 4c
- CPS 1893.04M420; 755 Fuel: Fuel Handling Floor Prefire Plan; Revision 4a
- CPS 1893.04M135; 781 Auxiliary (West): Div 2 Battery Room Prefire Plan; Revision 6
- CPS 1893.04M522; 762 Diesel Generator: Div 2 Diesel Generator Ventilation Room Prefire Plan; Revision 5a
- CPS 1893.04M520; 762 Diesel Generator: Div 3 Diesel Generator Ventilation Room Prefire Plan; Revision 5a
- CPS 1893.04M521; 762 Diesel Generator: Div 1 Diesel Generator Ventilation Room Prefire Plan; Revision 5a
- CPS 1893.04M003; Prefire Plan Legend; Revision 1
- CPS 1893.04M400; 712 Fuel: Basement Prefire Plan; Revision 5

71111.07—Heat Sink Performance

- AR 2634929; Inadequate Coating on Div III Jacket Water Hx
- AR 4114892; Response to NRC Question—1DG13A Coating
- CPS 8170.12; MetalClad CeramAlloy Protective Coatings; Revision 1
- CPS 1080.01; CPS Protective Coating Program; Revision 1b
- CPS 8130.01; Heat Exchanger Maintenance/Repairs; Revision 6
- ER-AA-330-014; Exelon Safety-Related (Service Level III) Coatings; Revision 2
- ER-AA-340-1002; Service Water Heat Exchanger Inspection Guide; Revision 7
- MA-CL-736-6001; Tightening of Flanged Connections; Revision 1
- MA-AA-718-010; Maintenance Planning; Revision 26
- EC 357995; CeramAlloy CL+ and CeramAlloy CP+ Approval for Use as a Service Level III Coating
- WO 973664; 1DG13A: Install Safety Related Coatings
- PO 569188; Div III Jacket Water Hx Coating Installation

71111.11—Licensed Operator Requalification Program and Licensed Operator Performance

- CPS 3005.01; Unit Power Changes; Revision 43b
- OP-AB-300-1003; Cycle-18 EOC Rod Pattern Adjustment

71111.12—Maintenance Effectiveness

- ER-AA-310; Implementation of Maintenance Rule; Revision 9
- ER-AA-310-1001; Maintenance Rule Scoping; Revision 4
- ER-AA-310-1002; Maintenance Rule Functions – Safety Significance Classification; Revision 3
- ER-AA-310-1003; Maintenance Rule – Performance Criteria Selection; Revision 4
- ER-AA-310-1004; Maintenance Rule – Performance Monitoring; Revision 13
- ER-AA-310-1005; Maintenance Rule – Dispositioning Between (a)(1) and (a)(2); Revision 7
- AR 2419369; Analog Trip Module RPV Pressure Found Out of Tolerance
- AR 4029024; EOID: RR B Motor Lower Oil Level Trending Down 1LR-RR01
- AR 2670593; PMC – Water Leak at Flex Hose for MS Elbow Taps in DW

71111.13—Maintenance Risk Assessments and Emergent Work Control

- ER-AA-600-1061; Fire PRA Model Update and Control; Revision 4
- ER-AA-600-1023; Paragon Model Capability; Revision 8
- WC-AA-101-1006; On-line Risk Management and Assessment; Revision 2
- ER-AA-600; Risk Management; Revision 7
- OP-AA-300; Reactivity Management; Revision 12

71111.15—Operability Determinations and Functionality Assessments

- CPS 9012.01D001; Scram Discharge Volume Vent and Drain Valve Operability Data Sheet; Revision 30a
- CPS 9012.01; Scram Discharge Volume Vent and Drain Valve Operability Test; Revision 31a
- EC 622952; 9012.01: SDV Vent/Drain Valves Delay Time OOS for Opening
- AR 4096084; 9012.01: SDV Vent/Drain Valves Delay Time OOS for Opening
- AR 4035488; 9012.01: SDV Vent/Drain Valves Delay Time OOS for Opening
- WR 1357909; 9012.01: SDV Vent/Drain Valves Delay Time OOS for Opening

- CR 1-92-01-011; Failure of SDV Vent and Drain Valves to Operate; Revision 0
- Revision Status Sheet 23A4175AA; Control Rod Drive System; Revision 8
- AR 4100389; 1B21N095B: OOTR Finds Data OOS
- AR 4100397; 1C11N017A: OOTR Finds OOS Data
- AR 4100394; 1B21N095A: OOTR Finds Data OOS
- CPS 9433.09A; ECCS Reactor Vessel Water Level 1B21-N095A Channel Calibration; Revision 0c
- CPS 9436.03; SDV Water Level C11-N017A Channel Calibration; Revision 35
- CPS 9433.09B; ECCS Reactor Vessel Water Level 1B21-N095B Channel Calibration; Revision 0c
- AR 4100662; Unexpected Annunciator 5042-5D High D/P Fuel Building
- AR 4098940; Butterfly Damper Disc Contacting Duct at Closed Position
- AR 4086972; Could not Bleed Air Off 1SX041A per 3211.01C003
- WO 4722908-01; Flush Div 3 SX System per 3211.01C003
- CPS 3211.01C003; Div III SX System Flush Checklist; Revision 6g
- AR 4098585; 1TITVH002 Reading Inaccurate, Needs Calibration
- WO 4738080; Perform Setpoint Check of Moore 535 Controllers
- CPS 8633.07; Division 2 SX Pump Room HVAC Ambient Temperature System Test; Revision 1a

71111.19—Post Maintenance Testing

- Dwg E02-1DG99; Schematic Diagram Diesel Generator System (DG) Diesel Generator 1B Excitation Clinton Power Station Unit 1, Sheet 33; Revision 0
- Dwg 61092; Clinton Power Station Unit 1 D.C. Schematic, Sheet 006; Revision B
- Dwg E02-1DG99; Schematic Diagram Diesel Generator System (DG) Diesel Generator 1B PGCC Interface Part 2, Sheet 018; Revision E
- WO 4754396-01; Abnormal Voltage Oscillations During Wiping the Mops
- WO 4754396-02; Abnormal Voltage Oscillations During Wiping the Mops
- WO 4754396-04; Abnormal Voltage Oscillations During Wiping the Mops
- CPS 2708.01; Diesel Generator Voltage Regulator and Governor Test; Revision 1c
- CPS 2708.01D001; Diesel Generator Voltage Regulator and Governor Test Data Sheet; Revision 1a
- WO 1954474-01; Division 3 Diesel Generator Voltage Adjustment MOP Checks
- WO 1954474-02; Division 3 Diesel Generator Voltage Adjustment MOP Checks
- WO 1953923-01; Calibrate Time Delay Relays K8A (1E22S001B-K8A)
- WO 1953923-02; Calibrate Time Delay Relays K8A (1E22S001B-K8A)
- WO 1855529-02; Perform Flush/Cleaning of SX Pipe 1SX50BC to Relief VLV 1SX1
- WO 1953916-07; 1DG01KC Perform 2 Year Maintenance and Inspections
- WO 1912105-01; Perform Trip-Point Calibration (8801.01)
- WO 1912105-02; Perform Trip-Point Calibration (8801.01)
- WO 1912105-03; Perform Trip-Point Calibration (8801.01)
- WO 1953916-04; 1DG01KC Perform 2 Year Maintenance and Inspections
- CPS 8207.07; Emergency Diesel Engine Two (2) Year Maintenance and Inspection; Revision 3
- WO 1953916-01; 1DG01KC Perform 2 Year Maintenance and Inspections
- WO 1951193-02; MM—Sample EHC Fluid/IMD—Calibration of 1PSFW237/237B/23
- WO 1951193-01; MM—Sample EHC Fluid/IMD—Calibration of 1PSFW237/237B/23

71111.22—Surveillance Testing

- PI-AA-125-1003; RCIC PCIV 1E51-F064 Isolated During 9030.01 Surveillance; Revision 4
- AR 4096509; RCIC PCIV 1E51-F064 Isolated During 9030.01 Surveillance
- CPS 9030.01C034; RCIC Steam Line Flow E31-N683A(B), E31-N684A(B) Checklist; Revision 32e
- CPS 9080.03; Diesel Generator 1C Operability—Manual and Quick Start Operability; Revision 35a
- WO 1835846-09; 1VY05AA Inspect, Boroscope, Clean, Eddy Current and Clean
- WO 4747109-02; 9080.02B22 OP DG 1B Oper—Monthly Test
- CPS 3506.01C002; Diesel Generator 1B Pre-Start Checklist; Revision 12a
- WO 4747109-01; 9080.02B22 OP DG 1B Oper—Monthly Test
- CPS 9080.02; Diesel Generator 1B Operability—Manual and Quick Start Operability; Revision 53a
- CPS 9080.02D001; Diesel Generator 1B Operability—Manual and Quick Start Data Sheet; Revision 43
- CPS 3506.01C005; Diesel Generator Start Log; Revision 1b
- CPS 3506.01D002; Diesel Generator 1B Operating Logs; Revision 5b
- WO 4686481-01; 9080.02B20 OP DG 1B Open—Semi-Annual Quick Start TST
- CPS 9051.01D001; HPCS Pump & HPCS Water Leg Pump Operability Data Sheet; Revision 48b
- CPS 9051.01; HPCS Pump & HPCS Water Leg Pump Operability; Revision 48d
- WO 4705733-01; 9051.01R22 OP HPCS Pump & Wtr Leg Pump Oper (RCIC Strg Tank)

71152—Problem Identification and Resolution

- AR 4082500; TDRFP Failed To Trip
- CPS 3811.03; Reactor Feed Pump Turbine Emergency Governor and Trip Mechanism Test
- AR 4041047; 1VY06C RHR Pump Room 'B' Supply Fan Tripped
- WO 4673406-02; IM Perform LOOP 1VY006 Calibration (8801.02)
- WO 1817219; Perform LOOP 1VY006 Calibration (8801.02)
- WO 4673406-13; 1VY06C RHR Pump Room 'B' Supply Fan Tripped
- WO 4673406-14; 1VY06C RHR Pump Room 'B' Supply Fan Tripped
- WO 4673406-11; 1VY06C RHR Pump Room 'B' Supply Fan Tripped
- WO 4673406-02; 1VY06C RHR Pump Room 'B' Supply Fan Tripped

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

- ER-AA-2004; System Vulnerability Review Process; Revision 1
- System Health Restoration Project Team (SHaRP) Charter
- AR 4020569; Manual Reactor Scram Due to Loss of Feedwater Heating
- AR 4083642; ERVR3 FW 2.1 Review Site Assignments
- AR 2633269; FW Heater String A Transient