



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION III  
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LISLE, IL 60532-4352

April 23, 2013

Mr. Michael J. Pacilio  
Senior Vice President, Exelon Generation Company, LLC  
President and Chief Nuclear Officer, Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: CLINTON POWER STATION - NRC INTEGRATED INSPECTION REPORT  
05000461/2013-002

Dear Mr. Pacilio:

On March 31, 2013, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Clinton Power Station. The enclosed report documents the inspection results, which were discussed on April 04, 2013, with Mr. W. Noll and other members of your staff.

This inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

Based on the results of this inspection, two NRC-identified findings and one self-revealed finding of very low safety significance were identified. Two of these findings were determined to involve violations of NRC requirements. Additionally, one licensee-identified violation, which was determined to be of very low safety significance, was reviewed by the inspectors and is listed in this report.

Because of the very low safety significance and because they were entered into your corrective action program, the NRC is treating the above inspector-identified, self-revealed, and licensee-identified violations as Non-Cited Violations (NCVs) consistent with Section 2.3.2 of the NRC Enforcement Policy. If you contest any NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial to the Nuclear Regulatory Commission, ATTN.: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at Clinton Power Station. In addition, if you disagree with a cross-cutting aspect assignment 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 Regional Administrator, Region III, and the NRC Resident Inspector at Clinton Power Station.

M. Pacilio

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In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be made available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's Agencywide Document Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Robert J. Orlikowski, Acting Branch Chief  
Branch 1  
Division of Reactor Projects

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

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000461/2013-002

Licensee: Exelon Generation Company, LLC

Facility: Clinton Power Station, Unit 1

Location: Clinton, IL

Dates: January 1 through March 31, 2013

Inspectors: B. Kemker, Senior Resident Inspector  
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Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000461/2013-002, 01/01/13 – 03/31/13; Clinton Power Station, Unit 1; Radiological Hazard Assessment and Exposure Controls, Identification and Resolution of Problems.

This report covers a three-month period of inspection by the resident inspectors and announced baseline inspections by regional inspectors. Three Green findings, two of which had an associated Non-Cited Violation, were identified. The significance of inspection findings are 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 June 2, 2011. Cross-cutting aspects are determined using IMC 0310, "Components within the Cross Cutting Areas," dated October 28, 2011. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### A. NRC-Identified and Self-Revealed Findings

#### Cornerstone: Mitigating Systems

- Green. The inspectors identified a finding of very low safety significance associated with the licensee's failure to correctly evaluate the past operability of safety-related motor operated valve 1E51-F031, reactor core isolation cooling system suppression pool suction valve, which failed quarterly surveillance testing on October 29, 2012. No violation of regulatory requirements was identified. The licensee entered this issue into its corrective action program for evaluation and initiated corrective actions to revise the past operability evaluation.

The finding was of more than minor significance since the failure to correctly evaluate a degraded/nonconforming condition potentially affecting the operability of structures, systems, and components (SSC) required to be operable by Technical Specifications (TS) would become a more significant safety concern, if left uncorrected, because it could reasonably result in an unrecognized condition of an SSC failing to fulfill a safety-related function. The finding was a licensee performance deficiency of very low safety significance because it: (1) was not a design or qualification deficiency; (2) did not represent an actual loss of function of a system; (3) did not represent an actual loss of function of a single train or two separate trains for greater than its TS allowed outage time; (4) did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety significant; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The inspectors concluded that this finding affected the cross-cutting area of human performance. Specifically, the licensee failed to use conservative assumptions in decision making while evaluating past operability of the valve by assuming that the time of inoperability was the same as the time of discovery for a time dependent failure mechanism (i.e., hardened grease) since no firm evidence to support operability was obtained by testing. (IMC 0310 H.1(b)) (Section 4OA2.3.b(1))

- Green. A finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings" was self-revealed when safety-related motor operated valve 1E51-F031, reactor core isolation cooling (RCIC) system suppression pool suction valve, failed to fully close during surveillance testing on October 29, 2012. The valve failure occurred due to the

licensee's failure to establish an adequate procedure to perform preventive maintenance on it. Specifically, the maintenance procedure did not contain a requirement to stroke a motor operated valve during the performance of periodic stem lubrication activities. The licensee entered this issue into its corrective action program for evaluation and initiated corrective actions to revise the maintenance procedure.

The finding was of more than minor significance since it was associated with the Procedure Quality attribute and adversely affected the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the valve failure rendered the RCIC system inoperable. This finding is of very low safety significance because it: (1) was not a design or qualification deficiency; (2) did not represent an actual loss of function of a system; (3) did not represent an actual loss of function of a single train or two separate trains for greater than its Technical Specification (TS) allowed outage time; (4) did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety significant; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The inspectors concluded that this finding affected the cross-cutting area of human performance since adequate licensee resources involving personnel and procedures did not support successful human performance. Specifically, the maintenance procedure was not appropriate to the circumstances because it did not contain adequate instructions to ensure that motor operated valve stems were adequately lubricated. (IMC 0310 H.2(c)) (Section 4OA2.3.b(2))

**Cornerstone: Occupational Radiation Safety**

- Green. The inspectors identified a finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 20.1501(a) for the failure to perform surveys to ensure compliance with 10 CFR 20.1201 shallow-dose equivalent (SDE) limits for five individuals during the fourth quarter 2011 due to contamination build-up on the workers' gloves. This issue was entered into the licensee's corrective action program as AR 01335298 and AR 01454976. Corrective actions include performing an apparent cause evaluation and performing dose assessments for the individuals involved.

The performance deficiency was determined to be of more than minor safety significance in accordance with IMC 0612, Appendix B, "Issue Screening," because it was associated with the Program And Process Attribute of the Occupational Radiation Safety Cornerstone and adversely affected the cornerstone objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that not performing an adequate SDE assessment affected the licensee's ability to monitor, control, and limit radiation exposures. The inspectors also reviewed the guidance in IMC 0612, Appendix E, "Examples of Minor Issues," and did not find any similar examples. In accordance with IMC 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," the inspectors determined that the finding had very low safety significance because the finding did not involve: (1) ALARA planning and controls, (2) a radiological overexposure, (3) a substantial potential for an overexposure, or (4) a compromised ability to assess dose. The primary cause of this finding was related to the cross-cutting aspect of human performance with the component of work practices. The specific aspect was that the licensee ensures supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported. (IMC 0310 H.4(c)) (Section 2RS1.1.b(1))

**B. Licensee-Identified Violations**

A violation of very low safety significance that was identified by the licensee has been reviewed by the inspectors. Corrective actions planned or taken by the licensee have been entered into the licensee's corrective action program.

## REPORT DETAILS

### Summary of Plant Status

The unit was operated at or near full power during the inspection period with the following exceptions:

- On February, 12, 2013, the licensee reduced power to about 91 percent to support maintenance on an off-site 345 kilovolt power line. The unit was returned to full power on February 28th.
- On March 3rd, the licensee reduced power to about 75 percent to perform a control rod sequence exchange, scram time testing of two control rods following maintenance on hydraulic control units, and main turbine control/stop/intermediate valve and main steam isolation valve testing. The unit was returned to full power later the same day.
- On March 7th, the unit automatically scrammed from full power following an unexpected trip of the main turbine generator. The unit was restarted on March 8th and was returned to full power on March 10th.

### 1. **REACTOR SAFETY**

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

#### 1R04 Equipment Alignment (71111.04)

##### .1 Quarterly Partial System Walkdowns (71111.04Q)

##### a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- Residual Heat Removal (RHR) Train B during maintenance on RHR Train A;
- Control Room Ventilation (VC) Train B during maintenance on VC Train A; and
- Shutdown Service Water (SX) Train C (single train risk significant system).

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones. The inspectors reviewed operating procedures, system diagrams, Technical Specification (TS) requirements, and the impact of ongoing work activities on redundant trains of equipment. The inspectors verified that conditions did not exist that could have rendered the systems incapable of performing their intended functions. The inspectors also walked down accessible portions of the systems to verify system components were aligned correctly and available as necessary.

In addition, the inspectors verified that equipment alignment problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected action requests (ARs) were reviewed to verify that corrective actions were appropriate and implemented as scheduled.



This inspection constituted three partial system walkdown inspection samples as defined in Inspection Procedure (IP) 71111.04.

b. Findings

No findings of significance were identified.

.2 Semi-Annual Complete System Walkdown (71111.04S)

a. Inspection Scope

The inspectors performed a complete system alignment inspection of the drywell cooling system to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down portions of the system to review mechanical and electrical equipment lineups, electrical power availability, system pressure and temperature indications, as appropriate, component labeling, component lubrication, component and equipment cooling, hangers and supports, operability of support systems, and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding work orders was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the corrective action program database to ensure that system equipment alignment problems were being identified and appropriately resolved.

This inspection constituted one complete system walkdown inspection sample as defined in IP 71111.04.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

The inspectors performed fire protection tours in the following plant areas:

- Fire Zone M-4, Fire Pump A Room – Elevation 699'0”;
- Fire Zone A-2m, Containment Electrical Penetration (East) Area – Elevation 762'0”;
- Fire Zone A-3g, Containment Electrical Penetration (West) Elevation 781'0”;
- Fire Zone A-4, Division 1 Battery Room – Elevation 781'0”;
- Fire Zone A-5, Division 2 Battery Room – Elevation 781'0”.

The inspectors verified that transient combustibles and ignition sources were appropriately controlled and assessed the material condition of fire suppression systems, manual firefighting equipment, smoke detection systems, fire barriers and emergency lighting units. The inspectors verified that fire hoses and extinguishers were

in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; that the licensee's fire plan was in alignment with actual conditions; and that fire doors, dampers, and penetration seals appeared to be in satisfactory condition.

In addition, the inspectors verified that fire protection related problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected action requests were reviewed to verify that corrective actions were appropriate and implemented as scheduled.

This inspection constituted five quarterly fire protection inspection samples as defined in IP 71111.05AQ.

b. Findings

No findings of significance were identified.

1R06 Flooding Protection Measures (71111.06)

.1 Internal Flooding (71111.06)

a. Inspection Scope

The inspectors reviewed selected risk important plant design features and licensee procedures intended to protect the plant and its safety-related equipment from internal flooding events. The inspectors reviewed flood analyses and design documents, including the Updated Final Safety Analysis Report (UFSAR), engineering calculations, and abnormal operating procedures to identify licensee commitments. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression or the circulating water systems. The inspectors also reviewed corrective action program documents associated with past internal flooding related items to verify that identified problems were entered into the licensee's corrective action program with the appropriate characterization. Selected action requests were reviewed to verify that the corrective actions were appropriate and implemented as scheduled. The inspectors performed a walkdown of the following plant areas to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were operable, and that the licensee complied with its commitments:

- Auxiliary Building Basement – 707'0" Elevation, and
- Turbine Building Basement – 707'0" Elevation.

This inspection constituted one internal flooding inspection sample as defined in IP 71111.06.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review of Licensed Operator Requalification (71111.11Q)

a. Inspection Scope

The inspectors observed licensed operators during simulator training on January 23, 2013. The inspectors assessed the operators' response to the simulated events focusing on alarm response, command and control of crew activities, communication practices, procedural adherence, and implementation of Emergency Plan requirements. The inspectors also observed the post-training critique to assess the ability of licensee evaluators and operating crews to self-identify performance deficiencies. The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements.

This inspection constituted one quarterly licensed operator requalification program simulator inspection sample as defined in IP 71111.11.

b. Findings

No findings of significance were identified.

.2 Resident Inspector Quarterly Observation of Heightened Activity or Risk (71111.11Q)

a. Inspection Scope

On March 3, 2013, the inspectors observed licensed operators in the Control Room perform portions of main turbine valve testing, control rod sequence exchange, power increase, and control rod scram time testing. This was an activity that required heightened awareness, additional detailed planning, and involved increased operational risk. The inspectors evaluated the following areas:

- Licensed operator performance;
- Crew's clarity and formality of communications;
- Ability to take timely actions in the conservative direction;
- Prioritization, interpretation, and verification of annunciators alarms;
- Correct use and implementation of procedures;
- Control panel manipulations;
- Oversight and direction from supervisors; and
- Ability to identify and implement appropriate TS actions.

This inspection constituted one quarterly licensed operator heightened activity/risk inspection sample as defined in IP 71111.11.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors evaluated the licensee's handling of selected degraded performance issues involving the following risk-significant structures, systems, and components (SSCs):

- Control Room Ventilation and Air Conditioning System Train B.

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the SSCs. Specifically, the inspectors independently verified the licensee's handling of SSC performance or condition problems in terms of:

- Appropriate work practices;
- Identifying and addressing common cause failures;
- Scoping of SSCs in accordance with 10 CFR 50.65(b);
- Characterizing SSC reliability issues;
- Tracking SSC unavailability;
- Trending key parameters (condition monitoring);
- 10 CFR 50.65(a)(1) or (a)(2) classification and reclassification; and
- Appropriateness of performance criteria for SSC functions classified (a)(2) and/or appropriateness and adequacy of goals and corrective actions for SSC functions classified (a)(1).

In addition, the inspectors verified that problems associated with the effectiveness of plant maintenance were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected action requests were reviewed to verify that corrective actions were appropriate and implemented as scheduled.

This inspection constituted one maintenance effectiveness inspection sample as defined in IP 71111.12.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and management of plant risk for maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- Planned maintenance during the week of January 21-25 on VC Train A;
- Planned maintenance during the week of February 3-8 on VC Train B;
- Planned maintenance during the week of February 11-15 on an off-site power transmission line and emergent maintenance on main generator output breaker 4506;

- Planned maintenance during the week of February 18-22 on the Division 4 Nuclear System Protection System Battery Charger, Control Rod Drive Pump A, and Stator Cooling Water Pump A;
- Planned maintenance during the week of February 25 – March 1 on RHR Train A; and
- Planned maintenance during the week of March 3-8 on the Emergency Reserve Auxiliary Transformer.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each of the above activities, the inspectors reviewed the scope of maintenance work in the plant's daily schedule, reviewed Control Room logs, verified that plant risk assessments were completed as required by 10 CFR 50.65(a)(4) prior to commencing maintenance activities, discussed the results of the assessment with the licensee's Probabilistic Risk Analyst and/or Shift Technical Advisor, and verified that plant conditions were consistent with the risk assessment assumptions. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify that risk analysis assumptions were valid, that redundant safety-related plant equipment necessary to minimize risk was available for use, and that applicable requirements were met.

In addition, the inspectors verified that maintenance risk related problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected action requests were reviewed to verify that corrective actions were appropriate and implemented as scheduled.

This inspection constituted six maintenance risk assessment inspection samples as defined in IP 71111.13.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- AR 01450247, "Part 21 Report – Commercial Grade Dedication Not Properly Applied to the Spacer in Butterfly Valve 1SC008C;"
- AR 01418152, "Loose Bolting on Floating End of Division 1 DG [Diesel Generator] Heat Exchangers;"
- AR 01461018, "ABB Part 21 on COM-5/SSC-T Protective Relays;" and
- AR 01486737, "Evaluate Restoration of Automatic VC High Chlorine Mode."

The inspectors selected these potential operability/functionality issues based on the risk significance of the associated components and systems. The inspectors verified that the conditions did not render the associated equipment inoperable or result in an unrecognized increase in plant risk. When applicable, the inspectors verified that the licensee appropriately applied TS limitations, appropriately returned the affected equipment to an operable status, and reviewed the licensee's evaluation of the issue

with respect to the regulatory reporting requirements. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluation. When applicable, the inspectors also verified that the licensee appropriately assessed the functionality of SSCs that perform specified functions described in the UFSAR, Operations Requirements Manual, Emergency Plan, Fire Protection Plan, regulatory commitments, or other elements of the current licensing basis when degraded or nonconforming conditions were identified.

In addition, the inspectors verified that problems related to the operability or functionality of safety-related plant equipment were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected action requests were reviewed to verify that corrective actions were appropriate and implemented as scheduled.

This inspection constituted four operability evaluation inspection samples as defined in IP 71111.15.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed post-maintenance testing for the following activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- WO 01504647-02, "Operations (OP) Perform Post-Maintenance Test (PMT) Leak Check Verify Operation of Dryer 2SA01D;"
- WO 01613252-01, "Breaker for 0AP57E-1B for 1VG-6Yb Slow to Fully Open;"
- WO 01569634-06, "OP PMT Scram Time Test 1C11D001AH (08-13)," and WO 00796237-13, "OP PMT Scram Time Test 1C11D001BS(16-53);"
- WO 01379878-04, "OP PMT Perform CPS 9061.10 for 1FC024A;"
- WO 01536441-05, "1RIXPR035: Perform 3 Corrective Action Checks From Equipment Apparent Cause Evaluation;" and
- WO 01369548-02, "OP 1E12F003A OPS PMT (9053.04)."

The inspectors reviewed the scope of the work performed and evaluated the adequacy of the specified post-maintenance testing. The inspectors verified that the post-maintenance testing was performed in accordance with approved procedures; that the procedures contained clear acceptance criteria, which demonstrated operational readiness and that the acceptance criteria was met; that appropriate test instrumentation was used; that the equipment was returned to its operational status following testing; and that the test documentation was properly evaluated.

In addition, the inspectors verified that problems associated with post-maintenance testing were entered into the licensee's corrective action program with the appropriate

characterization and significance. Selected action requests were reviewed to verify that the corrective actions were appropriate and implemented as scheduled.

This inspection constituted six post-maintenance testing inspection samples as defined in IP 71111.19.

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities (71111.20)

.1 Forced Outage C1F54 (71111.20)

a. Inspection Scope

The inspectors evaluated outage activities during Unit 1 forced outage C1F54, which began on March 7, 2013. Unit 1 automatically scrammed from full power following an unexpected trip of the main turbine generator. After the unit was shut down, the licensee identified a failed fuse on the 'C' phase of the main generator's voltage regulating potential transformer. The unit was restarted on March 8th and reached full power on March 10th.

The inspectors reviewed and evaluated the conduct of outage activities to ensure that the licensee considered risk in developing, planning, and implementing the forced outage schedule. The inspectors observed or reviewed plant equipment configuration and risk management, electrical lineups, startup activities, and identification and resolution of problems associated with the outage.

This inspection constituted one other outage inspection sample as defined in IP 71111.20.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the test results for the following surveillance testing activities to determine whether risk-significant systems and equipment were capable of performing their intended safety function and to verify that the testing was conducted in accordance with applicable procedural and TS requirements:

- CPS 9051.01, "HPCS [High Pressure Core Spray] Pump and HPCS Water Leg Pump Operability" (Inservice Test);
- CPS 9052.01, "LPCS [Low Pressure Core Spray] / RHR A Pumps & LPCS/RHR A Water Leg Pump Operability" (LPCS pump test portion) (Inservice Test);
- CPS 9015.01, "SLC [Standby Liquid Control] Valve Operability" (1C41-F001A and F001B test portion) (Routine Test);

- CPS 1019.07, "Leakage Reduction and Monitoring Program" (Reactor Coolant System Leakage Test);
- CPS 9068.01, "Hydrogen Mixing System Operability Test" (Routine Test) and;
- CPS 0931.10, "RPS [Reactor Protection System] Main Steam Line Isolation Valve Channel Functional" (Routine Test).

The inspectors observed selected portions of the test activities to verify that the testing was accomplished in accordance with plant procedures. The inspectors reviewed the test methodology and documentation to verify that equipment performance was consistent with safety analysis and design basis assumptions, and that testing acceptance criteria were satisfied.

In addition, the inspectors verified that surveillance testing problems were entered into the licensee's corrective action program with the appropriate characterization and significance. Selected action requests were reviewed to verify that corrective actions were appropriate and implemented as scheduled.

This inspection constituted two in-service tests, three routine surveillance tests, and one reactor coolant system leakage detection test for a total of six surveillance testing inspection samples as defined in IP 71111.22.

b. Findings

No findings of significance were identified.

**2. RADIATION SAFETY**

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

This inspection constituted a partial sample as defined in IP 71124.01.

.1 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors reviewed selected occurrences where a worker's personal electronic dosimeter (ED) noticeably malfunctioned or alarmed. The inspectors evaluated whether workers responded appropriately to the off-normal condition. The inspectors assessed whether the issue was included in the corrective action program and dose evaluations were conducted as appropriate.

b. Findings

(1) Incomplete ED Dose Rate Alarm Evaluation

Introduction

The inspectors identified a finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 20.1501(a) for the failure to perform surveys to ensure compliance with 10 CFR 20.1201 shallow-dose equivalent (SDE) limits for five workers during the fourth quarter 2011 due to contamination build-up on the workers' gloves.



## Description

In the fourth quarter of 2011, five workers were performing various activities in the reactor cavity that resulted in contamination build-up on the workers' gloves. When the workers placed their hands near their EDs to check their accumulated dose, the EDs went into alarm for high dose rates. The maximum ED dose rates for these individuals ranged from 750 mrem/hr (milli-rem per hour) to 1170 mrem/hr. The workers removed their anti-contamination clothing, exited the radiological controlled area (RCA), and reported to radiation protection. Radiation protection conducted personnel exposure investigations. However the investigation focused on whole body dose, and since the workers had been briefed to expect ED alarms, no further investigation was conducted.

During an NRC inspection during the first quarter of 2012, the inspectors questioned the adequacy of the investigation performed by the licensee and the lack of dose assessments to determine SDE for each of the workers involved. The inspectors opened Unresolved Item (URI) 05000461/2012002-03, "Incomplete ED Dose Rate Alarm Evaluation," to follow up on the issue.

The licensee has subsequently performed dose assessments for each of the workers with calculated SDE doses ranging from 292 mrem to 3.18 rem. The NRC reviewed the dose calculations and the variables that were required due to the extended time between the contamination events and the subsequent dose assessments. The inspectors determined that the distance between the hand and the detector of 1 centimeter (cm) assumed in the licensee's calculations was not appropriate. Specifically, the inspectors observed multiple workers and determined that the majority of workers hold the ED with their fingertips, which created a cupped hand configuration. The inspectors determined that a distance of at least 2.54 cm (1 inch) should have been used for determining the location of the ED relative to workers hand in the SDE dose calculation. The licensee has entered this discrepancy into its corrective action program as AR 01454976 and will perform a recalculation of the dose using a distance of 2.54 cm. The inspectors concluded none of the variables used in the calculation compromised the licensee's ability to assess the dose to the workers because this definition is reserved for the intake of radionuclides or whole body dose from external exposures.

## Analysis

The inspectors determined that the issue of concern was a performance deficiency because the licensee did not perform a complete dose assessment based on sound technical health physics principles to determine the SDE to five individuals during the fourth quarter of 2011. The inspectors determined that the cause of the performance deficiency was reasonably within the licensee's ability to foresee and correct, and should have been prevented.

The finding was not subject to traditional enforcement since the incidents did not have a significant safety consequence, did not impact the NRC's ability to perform its regulatory function, and were not willful.

The performance deficiency was determined to be of more than minor safety significance in accordance with Inspection Manual Chapter (IMC) 0612, Appendix B, "Issue Screening," because it was associated with the Program and Process Attribute of the Occupational Radiation Safety Cornerstone and adversely affected the cornerstone

objective of ensuring adequate protection of worker health and safety from exposure to radiation, in that not performing an adequate SDE assessment affected the licensee's ability to monitor, control, and limit radiation exposures. The inspectors also reviewed the guidance in IMC 0612, Appendix E, "Examples of Minor issues," and did not find any similar examples.

In accordance with IMC 0609, Appendix C, "Occupational Radiation Safety Significance Determination Process," the inspectors determined that the finding had very low safety significance (Green) because the finding did not involve: (1) As Low As Reasonably Achievable (ALARA) planning and controls, (2) a radiological overexposure, (3) a substantial potential for an overexposure, or (4) a compromised ability to assess dose.

#### Cross-Cutting Aspects

The inspectors identified that the primary cause of this finding was related to the cross-cutting aspect of human performance with the component of work practices. The specific aspect was that the licensee ensures supervisory and management oversight of work activities, including contractors, such that nuclear safety is supported. (IMC 0310 H.4(c)).

#### Enforcement

10 CFR 20.1501(a) requires that each licensee make or cause to be made surveys that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and that are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive materials, and the potential radiological hazards that could be present. 10 CFR 20.1201(a) states, in part, that the licensee shall control the occupational dose to adults. Contrary to the above, in the fourth quarter of 2011, the licensee did not make or cause to be made surveys that may have been necessary for the licensee to comply with the occupational dose limits set forth in 10 CFR 20.1201(a). Specifically, the licensee did not analyze the workers' gloves or perform dose assessments when it was determined that contamination build-up on the workers' gloves had occurred to such an extent that ED alarms were received. Since the violation of 10 CFR 20.1501(a) was of very low safety significance and has been entered in the licensee's corrective action program as AR 01335298, this violation is being treated as a Non-Cited Violation consistent with Section 2.3.2 of the NRC Enforcement Policy (**NCV 05000461/2013-002-01, Incomplete ED Dose Rate Alarm Evaluation**).

#### 2RS3 In-Plant Airborne Radioactivity Control and Mitigation (71124.03)

This inspection constituted one complete sample as defined in IP 71124.03.

##### .1 Inspection Planning (02.01)

##### a. Inspection Scope

The inspectors reviewed the UFSAR to identify areas of the plant designed as potential airborne radiation areas and any associated ventilation systems or airborne monitoring instrumentation. Instrumentation review included continuous air monitors (continuous air monitors and particulate-iodine-noble-gas-type instruments) used to identify changing

airborne radiological conditions such that actions to prevent an overexposure may be taken. The review included an overview of the respiratory protection program and a description of the types of devices used. The inspectors reviewed the UFSAR, TS, and emergency planning documents to identify the location and quantity of respiratory protection devices stored for emergency use.

The inspectors reviewed the licensee's procedures for maintenance, inspection, and use of respiratory protection equipment including self-contained breathing apparatus as well as procedures for air quality maintenance.

The inspectors reviewed reported performance indicators to identify any related to unintended dose resulting from intakes of radioactive material.

b. Findings

No findings of significance were identified.

.2 Engineering Controls (02.02)

a. Inspection Scope

The inspectors reviewed the licensee's use of permanent and temporary ventilation to determine whether the licensee uses ventilation systems as part of its engineering controls (in lieu of respiratory protection devices) to control airborne radioactivity. The inspectors reviewed procedural guidance for use of installed plant systems, such as containment purge, Fuel Building ventilation, and Auxiliary Building ventilation, and assessed whether the systems are used, to the extent practicable, during high-risk activities (e.g., using containment purge during cavity floodup).

The inspectors selected installed ventilation systems used to mitigate the potential for airborne radioactivity, and evaluated whether the ventilation airflow capacity, flow path (including the alignment of the suction and discharges), and filter/charcoal unit efficiencies, as appropriate, were consistent with maintaining concentrations of airborne radioactivity in work areas below the concentrations of an airborne area to the extent practicable.

The inspectors selected temporary ventilation system setups (high-efficiency particulate air/charcoal negative pressure units, down draft tables, tents, metal "Kelly buildings," and other enclosures) used to support work in contaminated areas. The inspectors assessed whether the use of these systems is consistent with licensee procedural guidance and ALARA concept.

The inspectors reviewed airborne monitoring protocols by selecting installed systems used to monitor and warn of changing airborne concentrations in the plant and evaluated whether the alarms and setpoints were sufficient to prompt licensee/worker action to ensure that doses are maintained within the limits of 10 CFR Part 20 and the ALARA concept.

The inspectors assessed whether the licensee had established trigger points (e.g., the Electric Power Research Institute's "Alpha Monitoring Guidelines for Operating Nuclear Power Stations") for evaluating levels of airborne beta-emitting (e.g., plutonium-241) and alpha-emitting radionuclides.

b. Findings

No findings of significance were identified.

.3 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

For those situations where it is impractical to employ engineering controls to minimize airborne radioactivity, the inspectors assessed whether the licensee provided respiratory protective devices such that occupational doses are ALARA. The inspectors selected work activities where respiratory protection devices were used to limit the intake of radioactive materials, and assessed whether the licensee performed an evaluation concluding that further engineering controls were not practical and that the use of respirators is ALARA. The inspectors also evaluated whether the licensee had established means (such as routine bioassay) to determine if the level of protection (protection factor) provided by the respiratory protection devices during use was at least as good as that assumed in the licensee's work controls and dose assessment.

The inspectors assessed whether respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration or have been approved by the NRC per 10 CFR 20.1703(b). The inspectors selected work activities where respiratory protection devices were used. The inspectors evaluated whether the devices were used consistent with their National Institute for Occupational Safety and Health/Mine Safety and Health Administration certification or any conditions of their NRC approval.

The inspectors reviewed records of air testing for supplied-air devices and self-contained breathing apparatus bottles to assess whether the air used in these devices meets or exceeds Grade D quality. The inspectors reviewed plant breathing air supply systems to determine whether they meet the minimum pressure and airflow requirements for the devices in use.

The inspectors selected several individuals qualified to use respiratory protection devices, and assessed whether they have been deemed fit to use the devices by a physician.

Due to limited in-field observations, the inspectors reviewed training curricula for users of respiratory protection devices and requested a demonstration of device use (donning, doffing, functional checks, and device malfunction) from selected individuals.

The inspectors chose multiple respiratory protection devices staged and ready for use in the plant or stocked for issuance for use. The inspectors assessed the physical condition of the device components (mask or hood, harnesses, air lines, regulators, air bottles, etc.) and reviewed records of routine inspection for each. The inspectors selected several of the devices and reviewed records of maintenance on the vital

components (e.g., pressure regulators, inhalation/exhalation valves, hose couplings). The inspectors reviewed the respirator vital components maintenance program to ensure onsite personnel assigned to repair the vital components have received the appropriate manufacturer-approved training.

b. Findings

No findings of significance were identified.

.4 Self-Contained Breathing Apparatus for Emergency Use (02.04)

a. Inspection Scope

Based on the UFSAR, TS, and Emergency Operating Procedure (EOP) requirements, the inspectors reviewed the status and surveillance records of self-contained breathing apparatuses staged in-plant for use during emergencies. The inspectors reviewed the licensee's capability for refilling and transporting self-contained breathing apparatus air bottles to and from the Control Room and Operations Support Center during emergency conditions.

The inspectors selected several individuals on Control Room shift crews and from designated departments currently assigned emergency duties (e.g., onsite search and rescue duties) to assess whether Control Room operators and other emergency response and radiation protection personnel (assigned in-plant search and rescue duties or as required by EOPs or the Emergency Plan) were trained and qualified in the use of self-contained breathing apparatuses (including personal bottle change out). The inspectors evaluated whether personnel assigned to refill bottles were trained and qualified for that task.

The inspectors determined whether appropriate mask sizes and types are available for use (i.e., in-field mask size and type match what was used in fit-testing). The inspectors determined whether on-shift operators had no facial hair that would interfere with the sealing of the mask to the face and whether vision correction (e.g., glasses inserts or corrected lenses) was available as appropriate.

The inspectors reviewed the past two years of maintenance records for selected self-contained breathing apparatus units used to support operator activities during accident conditions and designated as "ready for service" to assess whether any maintenance or repairs on any self-contained breathing apparatus unit's vital components were performed by an individual, or individuals, certified by the manufacturer of the device to perform the work. The vital components typically are the pressure-demand air regulator and the low-pressure alarm. The inspectors reviewed the onsite maintenance procedures governing vital component work to determine any inconsistencies with the self-contained breathing apparatus manufacturer's recommended practices. For those self-contained breathing apparatuses designated as "ready for service," the inspectors determined whether the required, periodic air cylinder hydrostatic testing was documented and up to date, and the retest air cylinder markings required by the U.S. Department of Transportation were in place.

b. Findings

No findings of significance were identified.

.5 Problem Identification and Resolution (02.05)

a. Inspection Scope

The inspectors evaluated whether problems associated with the control and mitigation of in-plant airborne radioactivity were being identified by the licensee at an appropriate threshold and were properly addressed for resolution in the licensee corrective action program. The inspectors assessed whether the corrective actions were appropriate for a selected sample of problems involving airborne radioactivity and were appropriately documented by the licensee.

b. Findings

No findings of significance were identified.

2RS4 Occupational Dose Assessment (71124.04)

This inspection constituted one complete sample as defined in IP 71124.04.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the results of radiation protection program audits related to internal and external dosimetry (e.g., licensee's quality assurance audits, self-assessments, or other independent audits) to gain insights into overall licensee performance in the area of dose assessment and focus the inspection activities consistent with the principle of "smart sampling."

The inspectors reviewed the most recent National Voluntary Laboratory Accreditation Program accreditation report on the vendor's most recent results to determine the status of the contractor's accreditation.

A review was conducted of the licensee procedures associated with dosimetry operations, including issuance/use of external dosimetry (routine, multi-badging, extremity, neutron, etc.), assessment of internal dose (operation of whole body counter, assignment of dose based on derived air concentration-hours, urinalysis, etc.), and evaluation of and dose assessment for radiological incidents (distributed contamination, hot particles, loss of dosimetry, etc.).

The inspectors evaluated whether the licensee had established procedural requirements for determining when external and internal dosimetry is required.

b. Findings

No findings of significance were identified.

.2 External Dosimetry (02.02)

a. Inspection Scope

The inspectors evaluated whether the licensee's dosimetry vendor is National Voluntary Laboratory Accreditation Program accredited and if the approved irradiation test categories for each type of personnel dosimeter used are consistent with the types and energies of the radiation present and the way the dosimeter is being used (e.g., to measure deep dose equivalent, shallow dose equivalent, or lens dose equivalent).

The inspectors evaluated the onsite storage of dosimeters before their issuance, during use, and before processing/reading. The inspectors also reviewed the guidance provided to radiation workers with respect to care and storage of dosimeters.

The inspectors assessed whether non-National Voluntary Laboratory Accreditation Program accredited passive dosimeters (e.g., direct ion storage sight read dosimeters) were used according to licensee procedures that provide for periodic calibration, application of calibration factors, usage, reading (dose assessment) and zeroing.

The inspectors assessed the use of active dosimeters (electronic personal dosimeters) to determine if the licensee uses a "correction factor" to address the response of the electronic personal dosimeter as compared to the passive dosimeter for situations when the electronic personal dosimeter must be used to assign dose. The inspectors also assessed whether the correction factor is based on sound technical principles.

The inspectors reviewed dosimetry occurrence reports or corrective action program documents for adverse trends related to electronic personal dosimeters, such as interference from electromagnetic frequency, dropping or bumping, failure to hear alarms, etc. The inspectors assessed whether the licensee had identified any trends and implemented appropriate corrective actions.

b. Findings

No findings of significance were identified.

.3 Internal Dosimetry (02.03)

Routine Bioassay (In Vivo)

a. Inspection Scope

The inspectors reviewed procedures used to assess the dose from internally deposited nuclides using whole body counting equipment. The inspectors evaluated whether the procedures addressed methods for differentiating between internal and external contamination, the release of contaminated individuals, the route of intake and the assignment of dose.

The inspectors reviewed the whole body count process to determine if the frequency of measurements was consistent with the biological half-life of the nuclides available for intake.

The inspectors reviewed the licensee's evaluation for use of its portal radiation monitors as a passive monitoring system to determine if instrument minimum detectable activities were adequate to determine the potential for internally deposited radionuclides sufficient to prompt additional investigation.

The inspectors selected several whole body counts and evaluated whether the counting system used had sufficient counting time/low background to ensure appropriate sensitivity for the potential radionuclides of interest. The inspectors reviewed the radionuclide library used for the count system to determine its appropriateness. The inspectors evaluated whether any anomalous count peaks/nuclides indicated in each output spectra received appropriate disposition. The inspector's reviewed the licensee's 10 CFR 61 data analyses to determine whether the nuclide libraries included appropriate gamma-emitting nuclides. The inspectors evaluated how the licensee accounts for hard-to-detect nuclides in the dose assessment.

b. Findings

No findings of significance were identified.

Special Bioassay (In Vitro)

a. Inspection Scope

The inspectors selected internal dose assessments obtained using in vitro monitoring. The inspectors reviewed and assessed the adequacy of the licensee's program for in vitro monitoring (i.e., urinalysis and fecal analysis) of radionuclides (tritium, fission products, and activation products), including collection and storage of samples.

The inspectors reviewed the Vendor Laboratory Quality Assurance Program and assessed whether the laboratory participated in an industry recognized Cross-Check Program including whether out-of-tolerance results were resolved appropriately.

b. Findings

No findings of significance were identified.

Internal Dose Assessment – Airborne Monitoring

a. Inspection Scope

The inspectors reviewed the licensee's program for airborne radioactivity assessment and dose assessment, as applicable, based on airborne monitoring and calculations of derived air concentration. The inspectors determined whether flow rates and collection times for air sampling equipment were adequate to allow lower limits of detection to be obtained. The inspectors also reviewed the adequacy of procedural guidance to assess internal dose if respiratory protection was used.

b. Findings

No findings of significance were identified.



## Internal Dose Assessment – Whole Body Count Analyses

### a. Inspection Scope

The inspectors reviewed several dose assessments performed by the licensee using the results of whole body count analyses. The inspectors determined whether affected personnel were properly monitored with calibrated equipment and that internal exposures were assessed consistent with the licensee's procedures.

### b. Findings

No findings of significance were identified.

## .4 Special Dosimetric Situations (02.04)

### Declared Pregnant Workers

#### a. Inspection Scope

The inspectors assessed whether the licensee informs workers, as appropriate, of the risks of radiation exposure to the embryo/fetus, the regulatory aspects of declaring a pregnancy, and the specific process to be used for (voluntarily) declaring a pregnancy.

The inspectors selected individuals who had declared pregnancy during the current assessment period and evaluated whether the licensee's Radiological Monitoring Program (internal and external) for declared pregnant workers is technically adequate to assess the dose to the embryo/fetus. The inspectors reviewed exposure results and monitoring controls employed by the licensee and with respect to the requirements of 10 CFR 20.

#### b. Findings

No findings of significance were identified.

### Dosimeter Placement and Assessment of Effective Dose Equivalent for External Exposures

#### a. Inspection Scope

The inspectors reviewed the licensee's methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the licensee's criteria for determining when alternate monitoring, such as use of multi-badging, was to be implemented.

The inspectors reviewed dose assessments performed using multi-badging to evaluate whether the assessment was performed consistently with licensee procedures and dosimetric standards.

#### b. Findings

No findings of significance were identified.

### Shallow Dose Equivalent

a. Inspection Scope

The inspectors reviewed shallow dose equivalent dose assessments for adequacy. The inspectors evaluated the licensee's method (e.g., VARSKIN or similar code) for calculating shallow dose equivalent from distributed skin contamination or discrete radioactive particles.

b. Findings

No findings of significance were identified.

### Neutron Dose Assessment

a. Inspection Scope

The inspectors evaluated the licensee's neutron dosimetry program, including dosimeter types and/or survey instrumentation.

The inspectors reviewed neutron exposure situations (e.g., independent spent fuel storage installation operations or at-power containment entries) and assessed whether (a) dosimetry and/or instrumentation was appropriate for the expected neutron spectra, (b) there was sufficient sensitivity for low dose and/or dose rate measurement, and (c) neutron dosimetry was properly calibrated. The inspectors also assessed whether interference by gamma radiation had been accounted for in the calibration and whether time and motion evaluations were representative of actual neutron exposure events, as applicable.

b. Findings

No findings of significance were identified.

### Assigning Dose of Record

a. Inspection Scope

For the special dosimetric situations reviewed in this section, the inspectors assessed how the licensee assigns dose of record for total effective dose equivalent, shallow dose equivalent, and lens dose equivalent. This included an assessment of external and internal monitoring results, supplementary information on Individual exposures (e.g., radiation incident investigation reports and skin contamination reports), and radiation surveys and/or air monitoring results when dosimetry was based on these techniques.

b. Findings

No findings of significance were identified.

.5 Problem Identification and Resolution (02.05)

a. Inspection Scope

The inspectors assessed whether problems associated with occupational dose assessment are being identified by the licensee at an appropriate threshold and are properly addressed for resolution in the licensee corrective action program. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee involving occupational dose assessment.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

40A1 Performance Indicator Verification (71151)

.1 Review of Submitted Quarterly Data

a. Inspection Scope

The inspectors performed a review of the data submitted by the licensee for the Fourth Quarter 2012 Performance Indicators for any obvious inconsistencies prior to its public release in accordance with IMC 0608, "Performance Indicator Program."

This inspection was not considered to be an inspection sample as defined in IP 71151.

b. Findings

No findings of significance were identified.

.2 Unplanned Scrams per 7000 Critical Hours

a. Inspection Scope

The inspectors verified the Unplanned Scrams per 7000 Critical Hours Performance Indicator for Unit 1. The inspectors reviewed each Licensee Event Report (LER) from January 1, 2012, through December 31, 2012, determined the number of scrams that occurred, and verified the licensee's calculation of critical hours. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. The inspectors noted that there were no unplanned scrams in 2012.

This inspection constituted one Unplanned Scrams per 7000 Critical Hours Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings of significance were identified.

.3 Unplanned Scrams with Complications

a. Inspection Scope

The inspectors verified the Unplanned Scrams with Complications Performance Indicator for Unit 1. The inspectors reviewed each LER from January 1, 2012, through December 31, 2012, determined the number of scrams that occurred, and evaluated each of the scrams against the performance indicator definition. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. The inspectors noted that there were no unplanned scrams with complications in 2012.

This inspection constituted one Unplanned Scrams with Complications Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings of significance were identified.

.4 Unplanned Power Changes per 7000 Critical Hours

a. Inspection Scope

The inspectors verified the Unplanned Power Changes per 7000 Critical Hours Performance Indicator for Unit 1. The inspectors reviewed power history data from January 1, 2012, through December 31, 2012, determined the number of power changes greater than 20 percent full power that occurred, evaluated each of the power changes against the performance indicator definition, and verified the licensee's calculation of critical hours. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator. The inspectors noted that there were no unplanned power changes in 2012.

This inspection constituted one Unplanned Power Changes per 7000 Critical Hours Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings of significance were identified.

.5 Safety System Functional Failures

a. Inspection Scope

The inspectors verified the Safety System Functional Failures Performance Indicator for Unit 1. The inspectors reviewed each LER from January 1, 2012, through December 31, 2012, determined the number of safety system functional failures that occurred, evaluated each LER against the performance indicator definition, and verified the number of safety system functional failures reported. The inspectors also reviewed the licensee's corrective action program database to determine if any problems had

been identified with the performance indicator data collected or transmitted for this indicator. The inspectors noted that there were three safety system functional failures in 2012.

This inspection constituted one Safety System Functional Failures Performance Indicator verification inspection sample as defined in IP 71151.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Some minor issues were entered into the licensee's corrective action program as a result of the inspectors' observations; however, they are not discussed in this report.

This inspection was not considered to be an inspection sample as defined in IP 71152.

b. Findings

No findings of significance were identified.

.2 Semi-Annual Trend Review

a. Inspection Scope

The inspectors reviewed repetitive or closely related issues documented in the licensee's corrective action program to look for trends not previously identified. This included a review of the licensee's quarterly trend coding and analysis reports to assess the effectiveness of the licensee's trending process. The inspectors also reviewed action requests regarding licensee-identified potential trends to verify that corrective actions were effective in addressing the trends and implemented in a timely manner commensurate with the significance.

This inspection constituted one semi-annual trend review inspection sample as defined in IP 71152.

b. Assessment and Observations

No findings of significance were identified.

(1) Overall Effectiveness of Trending Program

The inspectors determined that the licensee's trending program was generally effective at identifying, monitoring, and correcting adverse performance trends. The inspectors reviewed several common cause evaluations performed by the licensee to evaluate potential adverse performance and equipment trends. In general, these evaluations were performed well and identified appropriate corrective actions to address adverse trends that were identified. The inspectors did not identify any new adverse trends that were not already identified by the inspectors or the licensee and entered into the licensee's corrective action program.

(2) Continuing Adverse Trend in Evaluating Degraded/Nonconforming Plant Conditions for Operability, Functionality and/or Reportability

The inspectors noted that an adverse trend has continued involving the licensee's evaluation of degraded/nonconforming plant conditions for operability, functionality and/or reportability. The inspectors first identified and documented this adverse trend four years ago and have since documented several findings related to this adverse performance trend. In addition, past semi-annual trend reviews documented in inspection reports from 2009 through 2012 discussed examples of deficiencies with the licensee's evaluations when degraded or nonconforming conditions were discovered. The licensee's Nuclear Oversight organization has also noted this adverse performance trend in the past and documented examples of it.

The inspectors identified two findings involving inadequate past operability/reportability evaluations and one other example of an inadequate prompt operability determination during this semi-annual review period. The later example was not documented as a finding because the issue was ultimately determined to be of minor safety significance. Examples the inspectors identified during this review period included:

- AR 01401926 – The inspectors identified that the licensee had failed to submit a required LER within 60 days after discovery of an event that was reportable in accordance with 10 CFR 50.73(a)(2)(i)(B) as a condition which was prohibited by the plant's TS, and 10 CFR 50.73(a)(2)(v)(B) as a condition that could have prevented the fulfillment of a safety function. The condition involved an inoperable DG for longer than the TS completion time for restoration. The licensee had not correctly taken into consideration the known cause of failure of a DG ventilation system damper during its reportability review that indicated that the DG had been inoperable since it was last demonstrated operable during surveillance testing about 5 weeks earlier. This issue was documented as a Non-Cited Violation of 10 CFR 50.73, "Licensee Event Report System," in NRC Inspection Report 05000461/2012005.
- AR 01432799 – The inspectors identified that the licensee had failed to correctly evaluate the past operability of safety-related motor-operated valve (MOV) 1E51-F031, reactor core isolation cooling (RCIC) system suppression pool suction valve, which failed quarterly surveillance testing on October 29, 2012, due to hardened grease on the valve actuator. The licensee's evaluation of the condition did not address a potential failure mechanism of wear and degradation of the MOV stem nut, nor was there any mention of the well known consequence of reduced closing thrust capability that results from degraded stem lubrication.

In addition, no data for thrust capability or stem nut thread condition was ever obtained since the valve was not quarantined by the licensee after the failed surveillance test. Based upon the identified cause, the licensee's conclusion that inoperability was at time of discovery was not valid. This issue was documented as a finding of very low safety significance. Refer to Section 4OA2.3.b(1) of this inspection report.

- AR 01465590 – The inspectors identified water dripping through an open seam in insulation on the SX return line from the VC Train B air conditioning chiller. Without removing the insulation to examine the American Society of Mechanical Engineers (ASME) Code Class 3 piping for a possible through-wall leak, the licensee's prompt operability determination was that the source of water was condensation. In response to the inspectors' questions, the licensee was unable to provide any reasonable supporting basis for its conclusion that moisture from the air was condensing on the piping underneath the insulation. The insulation was sealed throughout its length with the exception of the small open seam near a vacuum breaker where the water was found dripping and nowhere else in the power plant was such a phenomena observed. However, the inspectors noted that there had been recent experience at the plant with through-wall pipe leakage from raw water piping systems. Specifically, in October 2011, a through-wall leak was discovered on the SX return line from the Division 3 DG heat exchanger. The inspectors discussed their concern with the licensee that insulation was not promptly removed and the piping inspected to identify the source of the leakage prior to commencing maintenance on the redundant VC Train A chiller. The licensee delayed removal of insulation to inspect the piping until after maintenance was completed on the VC Train A chiller two days later. Fortuitously, the source of leakage was discovered to be stem packing leakage from a valve located about 15 feet from where the water was found dripping. The water ran down the valve body, under the insulation, and then along the bottom of the insulation to the open seam.

Due to the fact that examples of this adverse performance trend continue to be identified and they have been entered into the licensee's corrective action program, and that separate findings have been documented when an inadequate evaluation has risen to a more than minor significance threshold, no additional finding of significance was identified at this time.

### .3 Annual In-Depth Review Sample

#### a. Inspection Scope

The inspectors selected the following action requests for in-depth review:

- AR 01471199, "Air Void Monitoring Results at Location RHB-7 Line 1RH117A2;"
- AR 01432799, "1E51F031 Failed to Shut from Main Control Room During 9054.04;" and
- AR 01383458, "No SX Flow Passing Through 1SX024A to 1VX06CA."

The inspectors verified the following attributes during their review of the licensee's corrective actions for the above action requests and other related action requests:

- 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/reportability issues;
- Classification and prioritization of the resolution of the problem, commensurate with safety significance;
- Identification of the root and contributing causes of the problem; and
- Identification of corrective actions, which were appropriately focused to correct the problem.

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

This inspection constituted three annual in-depth review inspection samples as defined in IP 71152.

b. Findings and Observations

(1) Failure to Perform Adequate Past Operability Evaluation for 1E51-F031, RCIC System Suppression Pool Suction Valve

Introduction

The inspectors identified a finding of very low safety significance associated with the licensee's failure to adequately evaluate the past operability of safety-related MOV 1E51-F031, RCIC system suppression pool suction valve, which failed quarterly surveillance testing on October 29, 2012. No violation of regulatory requirements was identified.

Discussion

On October 29, 2012, during a quarterly surveillance test, 1E51-F031 failed to fully close electrically from the Control Room while performing CPS 9054.04, "RCIC Automatic Suction Shift Test." At the time, the valve remotely indicated an intermediate position. Just prior to this, the surveillance test automatically stroked 1E51-F031 fully open in response to a simulated high suppression pool level. After its failure to stroke closed, the thermal overload for the valve was reset and Control Room operators again attempted to close the valve without success. The licensee then declared 1E51-F031 inoperable due to the inability to electrically close the valve. Because this valve is a primary containment isolation valve (PCIV), the licensee also entered TS Limiting Condition for Operation (LCO) 3.6.1.3, which required that the affected containment penetration flow path be isolated by the use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve within four hours of the PCIV being declared inoperable. The licensee chose to manually engage the hand wheel to close the inoperable valve in order to satisfy this LCO action requirement. In doing so, operators discovered that the valve was difficult to close during the first four turns of the hand wheel.



The inspectors noted that no attempt was made by the licensee to obtain information (i.e., physical evidence) upon which to base a credible past operability conclusion. The failed component was not quarantined after it was declared inoperable. 1E51-F031 was manually closed after the surveillance test failure instead of using the manual isolation valve, 1E51-F520, to satisfy the LCO requirement. This manual isolation valve is physically located next to 1E51-F031 and could have been used to isolate the containment penetration to satisfy the LCO requirement. No as-found inspection of the stem nut threads or valve stem threads was performed prior to valve maintenance; nor was a diagnostic thrust verification test conducted to verify whether the valve had been capable of performing its design safety function to close. The only physical evidence obtained was from an inspection of the grease on the MOV actuator.

The inspectors reviewed the results of the licensee's equipment apparent cause evaluation and past operability evaluations for the failed surveillance test. The licensee concluded that the cause of the valve failure to fully close was inadequate stem lubrication practices, which resulted in age-related grease hardening. The hardened grease increased the torque required for the motor to close the valve until the torque switch contacts opened. Exxon Nebula EP-1 grease was in use for 1E51-F031 prior to its failure to close. A large amount of operating experience exists regarding age-related hardening of Exxon Nebula EP-1 brand grease on MOVs. There are four stations in the Exelon fleet where this grease remains in use: Clinton, Byron, Braidwood, and Peach Bottom. On February 3, 2010, the NRC issued Information Notice (IN) 2010-03, "Failures of Motor-Operated Valves Due to Degraded Stem Lubricant." This IN states that: "Inadequate lubrication can cause excessive wear and degradation of the MOV stem nut such that the actuator cannot move or control the valve stem," and that, "Degradation of the lubricant...can affect the efficiency of the torque conversion thereby reducing the design margin for ensuring the performance of an MOV." The IN discusses two instances on March 12 and March 21, 2009; at Peach Bottom where hardened grease resulted in the failure of an MOV to fully open. The licensee at Peach Bottom implemented corrective actions to identify susceptible valves, perform visual inspections, and conduct diagnostic testing of those valves. During the extent-of-condition review, it was discovered that an additional valve was degraded due to grease deficiencies. The licensee at Peach Bottom then performed a diagnostic thrust verification test in order to evaluate the past operability of the valve. The as-found thrust was discovered to be less than the minimum required thrust value; therefore, the Peach Bottom licensee submitted an LER to report a condition prohibited by TS since there was evidence that the valve was in a degraded condition for a time period greater than the LCO required completion time. At Byron, on May 15, 2010, component cooling water valve 2CC9473 failed to stroke closed due to degraded valve stem lubrication of Nebula EP-1 grease. The licensee at Byron then performed diagnostic testing and determined through analysis of stem thrust and torque data that the torque switch contacts opened during a momentary spike at hammer blow at the beginning of the close stroke. At Braidwood, on June 18, 2010, containment spray valve 2CS009B failed to close after being stroked open during surveillance testing. The cause was attributed to degraded stem lubrication. The licensee at Braidwood then performed diagnostic testing (two strokes), which did not identify a reportable condition.

The inspectors reviewed EC 391444, "Evaluate Past Operability of 1E51-F031 Failure to Shut During 9054.04, 'RCIC Automatic Suction Shift Test,'" Revision 0. This engineering evaluation concluded that past operability of the close function was supported since the valve closed successfully during its previous quarterly surveillance test and had

remained closed until it was opened for the next scheduled surveillance test. An Operations Department review reached the same conclusion with similar reasoning, stating that the valve only became inoperable after it was opened. The licensee's Regulatory Affairs Department had an assignment to evaluate past operability as well. That evaluation concluded that the valve was left in the closed position between surveillances; therefore, it remained operable until the time of discovery when the valve failed to fully close on October 29, 2012. The inspectors noted, however, that the valve is required by design to be able to cycle open and closed during a postulated accident scenario; therefore, the valve must be at all times capable of performing this way in order to fulfill its design safety function and to be considered operable.

In none of the above three individual past operability evaluations was the potential failure mechanism of wear and degradation of the MOV stem nut addressed, nor was there any mention of the well known consequence of reduced closing thrust capability that results from degraded stem lubrication. As discussed above, no data for thrust capability or stem nut thread condition was obtained. Periodic diagnostic testing of MOVs is required by regulations to verify that minimum thrust can be generated by the component in order to adequately close the valve under design conditions. The most recent diagnostic test and inspection of 1E51-F031 prior to its failure was performed on April 13, 2005. The activity is currently scheduled on a 10-year frequency.

The inspectors noted that the licensee had not reported the event in accordance with 10 CFR 50.73, "Licensee Event Report System," Paragraph (a)(2)(i)(B), as a condition which was prohibited by the plant's TS for an inoperable PCIV longer than the TS completion time for restoration. The inspectors reviewed the guidance in NUREG 1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73," Revision 2 and questioned the licensee's conclusion that the event was not reportable based on the time of discovery. NUREG 1022, Section 3.2.2, states in part: "Generally, an operation or condition prohibited by the technical specifications existed and is reportable if surveillance testing indicates that equipment (e.g., one train of a multiple train system) was not capable of performing its specified safety functions (and thus was inoperable) for a period of time longer than allowed by technical specifications (i.e., LCO allowed outage time, or completion time for restoration of equipment in ISTS [Improved Standard Technical Specifications])." The guidance further states: "For the purposes of evaluating the reportability of a discrepancy found during surveillance testing that is required by the technical specifications... it should be assumed that the discrepancy occurred at the time of its discovery unless there is firm evidence, based on a review of relevant information such as the equipment history and the cause of failure, to indicate that the discrepancy existed previously." Based on the known cause of failure (i.e., hardened grease), it appeared to the inspectors that the condition had reasonably existed for longer than the 4-hour LCO completion time and therefore would have preceded the time of discovery. However, because the licensee did not quarantine 1E51-F031 after it failed to fully stroke closed during the testing to then obtain data for thrust capability or stem nut thread condition, firm evidence to demonstrate valve operability or inoperability was lost.

The inspectors concluded that the licensee's determination that inoperability of the valve occurred at the time of discovery of the failed surveillance test was not adequately justified in its past operability evaluations and would not be consistent with the guidance contained in NRC Regulatory Issue Summary 2005-20, "Revision to NRC Inspection Manual Part 9900 Guidance, 'Operability Determination & Functionality Assessments for

Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety,” Revision 1. Specifically, a “reasonable expectation” from the evidence collected for the operability of the valve prior to October 29, 2012, was not adequately established. The inspectors were further concerned that the question of past operability/reportability was performed by three independent assignments, with little apparent cohesion among them. The inspectors discussed this concern with the licensee. At the end of the inspection period, the licensee revised EC 391444 to better support its past operability/reportability conclusion. While the licensee has maintained that the valve was operable and the revised evaluation corrected some previously identified weaknesses, the inspectors could not conclude that the licensee’s supporting basis provided a high degree of confidence that the valve would have fully closed during an event to isolate the containment penetration since physical evidence to demonstrate valve operability was not obtained and only subjective evidence was provided in the revised evaluation.

### Analysis

The inspectors determined that the licensee’s failure to adequately evaluate the past operability of RCIC system suppression pool suction valve 1E51-F031 was a performance deficiency warranting a significance evaluation. The inspectors reviewed the examples of minor issues in IMC 0612, “Power Reactor Inspection Reports,” Appendix E, “Examples of Minor Issues,” and found two examples related to this issue. Examples 3j and 3k concluded that issues are generally not considered to be of minor significance when evaluation errors result in a reasonable doubt about the operability of a system or component, or when significant programmatic deficiencies are identified that could lead to worse errors if uncorrected. Consistent with the guidance in IMC 0612, Appendix B, “Issue Screening,” the inspectors determined that the failure to correctly evaluate a degraded/nonconforming condition potentially affecting the operability of an SSC required to be operable by TS would become a more significant safety concern, if left uncorrected, and was therefore more than a minor concern, because it could reasonably result in an unrecognized condition of an SSC failing to fulfill a safety-related function. Because the RCIC system is designed to respond to initiating events to prevent undesirable consequences (i.e., core damage), the inspectors concluded that this issue was associated with the Mitigating Systems Cornerstone. The inspectors performed a significance screening of this finding using the guidance provided in IMC 0609, “Significance Determination Process,” Appendix A, “The Significance Determination Process (SDP) for Findings At-Power.” In accordance with Exhibit 2, “Mitigating Systems Screening Questions,” the inspectors determined that that this finding was a licensee performance deficiency of very low safety significance (Green) because the finding: (1) was not a design or qualification deficiency; (2) did not represent an actual loss of function of a system; (3) did not represent an actual loss of function of a single train or two separate trains for greater than its TS allowed outage time; (4) did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety significant; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

### Cross-Cutting Aspects

The inspectors concluded that this finding affected the cross-cutting area of human performance. Specifically, the licensee failed to use conservative assumptions in decision making while evaluating past operability of the valve by assuming that the time of inoperability was the same as the time of discovery for a time dependent failure

mechanism (i.e., hardened grease) since no firm evidence to support operability was obtained by testing. (IMC 0310 H.1(b))

### Enforcement

No violation of regulatory requirements was identified. This issue is considered to be a finding (**FIN 05000461/2013-002-02, Failure to Perform Adequate Past Operability Evaluation for Reactor Core Isolation Cooling Suppression Pool Suction Valve**). The licensee entered this finding into its corrective action program as AR 01495906.

## (2) Failure to Perform Adequate MOV Preventive Maintenance Resulted in Inoperable RCIC System

### Introduction

A finding of very low safety significance with an associated Non-Cited Violation of 10 CFR 50, Appendix B, Criteria V, "Instructions, Procedures, and Drawings" was self-revealed on October 29, 2012, when safety-related MOV 1E51-F031, RCIC system suppression pool suction valve, failed to fully close during surveillance testing. The MOV failure occurred due to the licensee's failure to establish an adequate procedure to perform maintenance on it. Specifically, the maintenance procedure did not contain a requirement to stroke MOVs during the performance of periodic stem lubrication activities.

### Discussion

On October 29, 2012, during a quarterly surveillance test, 1E51-F031 failed to fully close electrically from the Control Room while performing CPS 9054.04, "RCIC Automatic Suction Shift Test." The inspectors reviewed the results of the licensee's equipment apparent cause evaluation for the failed surveillance test. After thoroughly cleaning and lubricating the valve stem, 1E51-F031 could be stroked normally; therefore, the licensee concluded that the valve failed to fully close due to the presence of degraded (i.e., hardened) grease found on the valve stem. The licensee attributed the degraded grease to inadequate MOV stem lubrication practices. The licensee concluded that the apparent cause of inadequate stem lubrication preventive maintenance was the absence of a procedural requirement to stroke the MOV during the performance of its periodic stem lubrication activities.

Prior to the valve test failure, the most recent stem lubrication of 1E51-F031 occurred on August 3, 2009. The only job step listed for the work order task was to "Lubricate 1E51-F031 stem per MA-AA-723-301." MA-AA-723-301 Section 3, "Precautions, Limitations, and Prerequisites," Paragraph 3.2.10, stated: "If the valve is not capable of being stroked or have the stem load relaxed during the performance of this procedure due to plant conditions, then supervision and/or engineering should be contacted to determine if this task is scheduled correctly." Section 4.9 of this procedure contained a note stating: "Valves should be stroked to make as much of the stem accessible as possible for cleaning and lubrication. Ensure that all old grease and degreasing solvent residue are removed before applying new thread lubricant." The licensee interviewed maintenance technicians who believed that neither the legacy nor the current maintenance procedure specifically required the valve to be stroked to complete the maintenance and that the expectation could be that they clean and re-lubricate only the

accessible portions of the stem and declare the maintenance to be completed. Interviews with operations personnel revealed that if stroking a valve is necessary to properly perform and credit a preventive maintenance activity they would expect that it be grouped with other evolutions that stroke the valve, such as a required surveillance test.

An extent of condition review was performed by the licensee. That review determined that there were 75 valves within the Generic Letter 96-05 MOV Program that were potentially not stroked the last time their valve stems were lubricated. The work order closure notes for those valves revealed 35 that specifically stated that the valve was stroked during the maintenance. Of the 40 remaining, 19 had closure notes stating that the valve was not stroked and 1 was assumed to not have been stroked since the maintenance was performed online and the valve cannot be stroked online. The remaining 20 valves were also assumed to have not been stroked.

Near-term corrective actions included a revision to MA-AA-723-301 to require that MOVs be stroked during stem lube activities in order to credit performance of the maintenance. In addition, a schedule and plan to address the valves identified during the extent of condition review was presented and approved at a Plant Health Committee meeting. Priorities for that schedule were subsequently revisited by the licensee after the inspectors expressed concern over a high safety significant valve that was scheduled last for stem cleaning and lubrication. The valve, 1E12-F024A, had been scheduled for maintenance in October 2014. In response to the inspectors' questions, the licensee moved up the preventive maintenance schedule date.

### Analysis

The inspectors determined that the licensee's failure to establish an adequate procedure to perform maintenance on 1E51-F031 and to ensure adequate lubrication of the valve stem was a performance deficiency warranting a significance evaluation. The inspectors reviewed the examples of minor issues in IMC 0612, "Power Reactor Inspection Reports," Appendix E, "Examples of Minor Issues," and found no examples related to this issue. Because the RCIC system is designed to respond to initiating events to prevent undesirable consequences (i.e., core damage), the inspectors concluded that this issue was associated with the Mitigating Systems Cornerstone. Consistent with the guidance in IMC 0612, Appendix B, "Issue Screening," the inspectors determined that the finding was associated with the Procedure Quality attribute and adversely affected the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). Specifically, the valve surveillance test failure rendered the RCIC system inoperable. The inspectors performed a significance screening of this finding using the guidance provided in IMC 0609, "Significance Determination Process," Appendix A, "The SDP for Findings At-Power." In accordance with Exhibit 2, "Mitigating Systems Screening Questions," the inspectors determined that this finding was a licensee performance deficiency of very low safety significance (Green) because the finding: (1) was not a design or qualification deficiency; (2) did not represent an actual loss of function of a system; (3) did not represent an actual loss of function of a single train or two separate trains for greater than its TS allowed outage time; (4) did not represent an actual loss of function of one or more non-TS trains of equipment designated as high safety significant; and (5) did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event.

### Cross-cutting Aspects

The inspectors concluded that this finding affected the cross-cutting area of human performance since adequate licensee resources involving personnel and procedures did not support successful human performance. Specifically, MA-AA-723-301 was not appropriate to the circumstances because the procedure did not require instructions to ensure that complete lubrication of the valve stem occurs rather than only portions that are accessible without stroking the valve. (IMC 0310 H.2(c))

### Enforcement

10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Contrary to the above, maintenance procedure MA-AA-723-301, "Periodic Inspection of Limatorque Model SMB/SB/SBD-000 Through 5 Motor Operated Valves," Revision 8, was not appropriate to the circumstances because it did not contain a requirement to stroke safety-related MOVs during the performance of standalone valve stem lubrication, and specifically during maintenance performed on RCIC system suppression pool suction valve 1E51-F031 on August 3, 2009. This resulted in the failure of 1E51-F031 to fully close during the performance of surveillance testing on October 29, 2012. Because of the very low safety significance, this violation is being treated as a Non-Cited Violation consistent with Section 2.3.2 of the NRC Enforcement Policy **(NCV 05000461/2013-002-03, Failure to Perform Adequate Motor Operated Valve Preventive Maintenance Resulted in Inoperable Reactor Core Isolation Cooling System)**. The valve was repaired and returned to an operable status later that evening on October 29, 2012. The licensee entered this violation into its corrective action program as AR 01432993.

#### 40A3 Followup of Events and Notices of Enforcement Discretion (71153)

##### .1 (Closed) LER 05000461/2012-003-00, "Breaker Failure Leads to Loss of Safety Function and System Start"

On November 23, 2012, a non-licensed operator reported to the Control Room that the VC Train B chiller power supply breaker was cycling open and closed with no demand signal. The operator attempted several times to open the breaker with no success. Control Room operators noted that panel indicating lights for the chiller were dimming and brightening during this time and a Division 2 direct current ground fault alarm annunciated and then cleared. Control Room operators directed the non-licensed operator to locally shutdown the chiller. Upon shutting down the chiller, breaker noise increased and, minutes later, smoke was observed coming from the breaker enclosure. In response, Control Room operators manually de-energized the Control Building Unit Substation B cubicle that housed the chiller power supply breaker.

Due to the resultant loss of power, several plant safety systems were affected including: (1) the Division 2 Fuel Building ventilation (VF) system isolation dampers lost power and closed, causing a loss of secondary containment differential pressure and loss of safety function; (2) the Division 2 instrument air system and service air system containment isolation valves lost power and failed closed; (3) the Division 4 inverter and battery

charger room cooler lost power, rendering the inverter, battery charger, and HPCS system inoperable; and, (4) VC Train B was rendered inoperable. After evaluating plant conditions, operators racked out the VC Train B chiller power supply breaker and reenergized the Unit Substation B cubicle. Upon restoration of power, the Division 2 SX system automatically initiated.

Due to loss of the VF system, secondary containment differential pressure increased above the 0.25 inches vacuum required by TS 3.6.4.1, "Secondary Containment," resulting in a loss of safety function. Operators entered EOP 8, "Secondary Containment Control," and manually started the standby gas treatment system to restore secondary containment differential pressure within about 6 minutes. The HPCS system and VC Train B were restored to an operable status when the Unit Substation B cubicle was reenergized within about 4 minutes. The VF system, instrument air and plant service air supplies to containment were subsequently restored. The inspectors reviewed plant operators' response during the event and identified no issues of concern.

The licensee completed an 8-hour notification call (Event Notification 48533) on November 24th to report the loss of secondary containment differential pressure under 10 CFR 50.72(b)(3)(v)(C) as an event or condition that at the time of discovery could have prevented the fulfillment of a safety function of SSCs that are needed to control the release of radioactive material. The licensee also reported the unplanned inoperability of HPCS under 10 CFR 50.72(b)(3)(v)(D) as an event or condition that at the time of discovery could have prevented the fulfillment of a safety function of SSCs that are needed to mitigate the consequences of an accident since HPCS is a single train system.

The licensee submitted LER 05000461/2012-003-00 to report this event in accordance with 10 CFR 50.73(a)(2)(v)(C) as an event or condition that could have prevented the fulfillment of the safety function of structures or systems that are needed to control the release of radioactive material, 10 CFR 50.73(a)(2)(v)(D) as an event or condition that could have prevented the fulfillment of a safety function of structures or systems that are needed to mitigate the consequences of an accident, and 10 CFR 50.73(a)(2)(iv)(A) as an event or condition that resulted in the invalid automatic actuation of the SX system and closure of the instrument air and plant service air containment isolation valves.

The inspectors reviewed the licensee's equipment apparent cause evaluation for the breaker failure. The licensee determined that the breaker closing spring charging mechanism had failed to operate as designed. The licensee sent the breaker to a test laboratory for failure analysis. The laboratory identified that the breaker primary latch spring was no longer attached to the magnetic latch for proper operation. This would suggest that the spring may not have been properly attached to the post during breaker refurbishment; however, the breaker was cycled multiple times since then. According to the vendor that refurbished the breaker in 2011, the breaker was cycled at least 50 times at its facility prior to shipping it back to the licensee with no problems identified. The licensee's electrical maintenance craftsmen also cycled the breaker several times prior to installing it in the plant in January 2012. The breaker cycled at least 24 more times while in service before failing. The inspectors did not identify any significant safety issue that was neglected in the licensee's equipment apparent cause evaluation. The licensee replaced the failed breaker with a newly refurbished breaker to restore the VC Train B chiller to an operable status. The inspectors concluded that there was no performance

deficiency associated with this event since the cause for the breaker failure was not reasonably within the licensee's ability to foresee and correct.

LER 05000461/2012-003-00 is closed.

This inspection constituted one event follow-up inspection sample as defined in IP 71153.

.2 (Closed) LER 05000461/2011-007-00, "Un-Fused DC [Direct Current] Ammeter Circuits Result in Unanalyzed Condition"

This LER described an unanalyzed condition affecting the wiring design for the station battery ammeter circuits at Clinton Power Station. Specifically, the licensee identified that the original plant wiring design for the station battery ammeter circuits contained a shunt in the current flow from each battery which was connected to the ammeters in the Control Room via Institute of Electrical and Electronics Engineers (IEEE) IEEE-383 qualified leads and cables. The ammeter wiring attached to the shunt did not have fuses, and if one of the ammeter wires shorted to ground at the same time as another DC wire from the opposite polarity on the same battery, a ground loop through the unfused ammeter cable could occur. Thermal and/or arcing effects from the damaged ammeter cable could damage other cables resulting in loss of the associated safe shutdown capability. This design condition existed in Divisions 1, 2, and 4 for the DC ammeter circuits. Division 3 was not affected because it did not contain a remote Control Room ammeter circuit.

The licensee submitted LER 05000461/2011-007-00 to report this event in accordance with 10 CFR 50.73(a)(2)(ii)(B) as an event or condition that resulted in the nuclear power plant being in an unanalyzed condition that significantly degraded plant safety. The licensee entered this issue into its corrective actions program as AR 01299460, "DC Ammeter Circuit Deficiency," and implemented a fire watch in all non-continuously manned affected fire zones as immediate compensatory measures. The licensee then modified the ammeter circuits and installed fuses in DC motor control centers 1A, 1B and 1D for the protection of ammeter circuits.

The significance and enforcement aspects of this issue are discussed in Section 4OA7.1 of this inspection report. LER 05000461/2011-007-00 is closed.

This inspection constituted one event follow-up inspection sample as defined in IP 71153.

.3 Reactor Scram Response

a. Inspection Scope

On March 7, 2013, Unit 1 automatically scrammed from full power following an unexpected trip of the main turbine. The inspectors responded to the Control Room to verify that post-scram plant parameters were as expected. The inspectors also reviewed plant procedures, equipment configurations, and Control Room logs. The inspectors verified that operator response was in accordance with plant procedures and that plant equipment responded as designed.



This inspection constituted one event follow-up inspection sample as defined in IP 71153.

b. Findings

No findings of significance were identified.

4OA5 Other Activities

.1 Previously Completed Inspection Activities

Two inspection activities were completed during the 4th quarter 2012 that were inadvertently omitted from NRC Inspection Report 05000461/2012-005. These inspection activities were:

- The review of planned maintenance during the week of December 17th on the Division 3 Battery Charger and High Pressure Core Spray System. This inspection constituted one maintenance risk assessment inspection sample as defined in IP 71111.13.
- The review of surveillance testing results for CPS 9813.01, "Control Rod Scram Time Testing." This inspection constituted one routine surveillance testing inspection sample as defined in IP 71111.22.

.2 (Closed) URI 05000461/2012-004-04, "Evaluation of High Pressure Core Spray Test Return Line Pipe Support Failure"

The inspectors had opened URI 05000461/2012004-04 to determine whether the design basis structural analysis for primary containment penetration 1PC0033 was in conformance with ASME Section III requirements. Specifically, the design basis calculation for containment penetration 1PC0033 shows a current overstress condition (i.e., applied stress > allowable stress) for the Level D load condition. As a result, the inspectors were not able to determine if the design basis calculation was sufficient to ensure conformance with ASME Section III requirements.

The inspectors reviewed operability evaluation AR 01380555, "HPCS Test Return Line Hanger Damaged," related to the licensee's reevaluation of HPCS test return line (1HP18C-12) without HPCS test return line pipe support 1HP06003G, which had failed and pieces were found by operators at the bottom of the suppression pool. The inspectors also reviewed the licensing basis analysis for containment penetration 1PC0033 (also termed 1MC0033). This penetration is a restraint for HPCS test return line (1HP18C-12) and was evaluated for the removal of pipe support 1HP06003G as well.

As described in UFSAR Section 3.8.1.5.3, the licensing basis Code of record for containment penetration 1MC0033 is ASME Section III, 1974 Edition, Subsection NE. The ASME Design Specification for piping penetration assemblies (including containment penetrations) is DS-ME-09-CP, "Piping Penetration Assemblies Design Specification," Revision 15. ASME Design Specification DS-ME-09-CP does not define a jurisdictional boundary for the piping portion that is considered part of the containment penetration. The jurisdictional boundary of the piping that is part of the containment penetration is defined by ASME Section III, Subsection NE, which states in

Section NE-1131, Part C: "All piping attached to containment vessel nozzles or to penetration assemblies out to and including the valve or valves required to isolate the system and provide a pressure boundary for the containment function. Such piping shall be designed for the intended service function and the containment function considered either independently or in combination as required by the Design Specification (NA-3250)."

The inspectors reviewed an original construction calculation (CQD-4536-IPC0033, "Penetration Stress Analysis Report for Primary Containment Penetration 1PC0033," Revision 1) that was referenced by the licensee in the operability evaluation. The calculation shows a current overstress condition (i.e., applied stress > allowable stress) for the Level D faulted load condition. The applied stresses due to the level D faulted load condition are due to pipe rupture/jet impingement plus the normal operating system pressure. The design calculation for the containment penetration was identified as nuclear safety-related (Q). UFSAR Section 3.8.1.1.3 describes the safety function of the containment penetration and UFSAR Table 3.8-5 shows the location and size of the containment penetration.

In response to the inspectors' questions regarding the current overstress condition for the containment penetration the licensee initiated AR 01418577. The licensee also initiated AR 01417729 to address the inspectors' question regarding conformance of design requirements with the ASME Code and design specification. During this inspection period, the inspectors reviewed additional information provided by the licensee relevant to the containment penetration calculation determination of applied stresses due to Level D load conditions. Upon the additional review and discussions with the licensee, no significant issues of concern were identified with the licensee's operability evaluation or the supporting calculations for the containment penetration.

URI 05000461/2012-004-04 is closed.

.3 Temporary Instructions (TI) - 2515/182 - Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks

a. Inspection Scope

Leakage from buried and underground pipes has resulted in ground water contamination incidents with associated heightened NRC and public interest. The industry issued a guidance document, Nuclear Energy Institute (NEI) 09-14, "Guideline for the Management of Buried Piping Integrity" (ADAMS Accession No. ML1030901420) to describe the goals and required actions (commitments made by the licensee) resulting from this underground piping and tank initiative. On December 31, 2010, NEI issued Revision 1 to NEI 09-14, "Guidance for the Management of Underground Piping and Tank Integrity," (ADAMS Accession No. ML110700122), with an expanded scope of components which included underground piping that was not in direct contact with the soil and underground tanks. On November 17, 2011, the NRC issued TI-2515/182 "Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks" to gather information related to the industry's implementation of this initiative.

From February 11 - 22, 2013, the inspectors conducted a review of records and procedures related to the licensee's program for buried pipe, underground pipe, and tanks in accordance with Phase II of TI-2515/182. This review was performed to confirm

that the licensee's program contained attributes consistent with Sections 3.3 A and 3.3 B of NEI 09-14 and to confirm that these attributes were scheduled and/or completed by the NEI 09-14 Revision 1 deadlines. The inspectors also conducted interviews with licensee staff responsible for the site Buried Piping Program to determine whether the program attributes were implemented in a manner that reflected good or poor practices in program management.

Based upon the scope of the review described above, Phase II of TI-2515/182 was completed.

b. Observations

The licensee's buried piping and underground piping and tanks program was inspected in accordance with Paragraph 03.02.a of the TI and it was confirmed that activities which correspond to completion dates specified in the program which have passed since the Phase I inspection was conducted, have been completed. Additionally, the licensee's Buried Piping and Underground Piping and Tanks Programs were inspected in accordance with Paragraph 03.02.b of the TI and responses to specific questions found in <http://www.nrc.gov/reactors/operating/ops-experience/buried-pipe-ti-phase-2-insp-req-2011-11-16.pdf> were submitted to the NRC headquarters staff.

c. Findings

No findings of significance were identified.

.4 (Closed) Temporary Instruction 2515/187 – Inspection of Near-Term Task Force Recommendation 2.3 – Flooding Walkdowns

a. Inspection Scope

On August 20, 2012, the inspectors commenced activities to verify that Clinton Power Station conducted external flood protection walkdown activities using an NRC-endorsed walkdown methodology. These flooding walkdowns are being performed at all sites in response to Enclosure 4 of a letter from the NRC to licensees entitled, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012 (ADAMS Accession No. ML12053A340). In early January of this inspection period inspectors completed the last of their activities in accordance with this temporary instruction.

b. Findings

No findings of significance were identified.

.5 (Closed) Temporary Instruction 2515/188 – Inspection of Near-Term Task Force Recommendation 2.3 – Seismic Walkdowns

a. Inspection Scope

On September 10, 2012, the inspectors commenced activities to verify that Clinton Power Station conducted seismic walkdown activities using an NRC-endorsed seismic walkdown methodology. These seismic walkdowns are being performed at all sites in

response to Enclosure 3 of a letter from the NRC to licensees entitled, "Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident," dated March 12, 2012 (ADAMS Accession No. ML12053A340). In early January of this inspection period inspectors completed the last of their activities in accordance with this temporary instruction.

b. Findings

No findings of significance were identified.

4OA6 Management Meetings

.1 Resident Inspectors' Exit Meeting

The inspectors presented the inspection results to Mr. W. Noll and other members of the licensee's staff at the conclusion of the inspection on April 4, 2013. The licensee acknowledged the findings presented. Proprietary information was examined during this inspection, but is not specifically discussed in this report.

.2 Interim Exit Meetings

Interim exit meetings were conducted for:

- The Radiological Hazard Assessment and Exposure Controls, and Radiological Environmental Monitoring Inspection with Mr. N. Hightower and other members of the licensee's staff on January 9, 2013. The licensee confirmed that none of the potential report input discussed was considered proprietary.
- The Review of the Industry Initiative to Control Degradation of Underground Piping and Tanks (TI -2515/182) with Mr. S. Mohundro and other members of the licensee staff on February 22, 2013. The licensee confirmed that none of the potential report input discussed was considered proprietary.
- The In-Plant Airborne Radioactivity Control and Mitigation; and Occupational Dose Assessment Inspection with Mr. J. Cunningham and other members of the licensee's staff on March 2013. The licensee confirmed that none of the potential report input discussed was considered proprietary.

4OA7 Licensee-Identified Violations

The following violation of very low significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section 2.3.2 of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Non-Cited Violation.

.1 Un-Fused DC Ammeter Circuits Result in Unanalyzed Condition

Clinton Power Station Unit 1 Operating Licensee Condition 2.F required, in part, that the licensee implement and maintain in effect all provisions of the approved Fire Protection Program as described in the Final Safety Analysis Report, as amended, and as approved in the Safety Evaluation Report (NUREG-0853), dated February 1982 and Supplemented Numbers 1 through 8.

The Clinton Power Station UFSAR, Appendix F, "Safe Shutdown Analysis," Section 1.5, "Associated Circuits," stated, in part, that at Clinton Power Station, there were no associated non-safe shutdown cables that were not electrically protected and shared a common enclosure with safe shutdown cables.

Contrary to the above, on December 8, 2011, the licensee identified that non-safe shutdown cables that shared a common enclosure with safe shutdown cables were not electrically protected. Specifically, the licensee identified that the battery ammeter circuits routed from the DC motor control centers to the ammeters located in the Control Room were not fused. These cables were routed in trays and installed in panels with other safe shutdown cables. During a fire event in the Control Room, fire-induced failures could have damaged the ammeter circuit and could have resulted in damaging other safe shutdown cables that are in direct physical contact with these cables in different fire zones.

The licensee completed a fire risk evaluation for worst case fire scenarios in the Control Room and concluded that the delta core damage frequency ( $\Delta$ CDF) from a fire due to the un-fused ammeter circuit was 8.26E-8 per year. The evaluation also concluded that for all postulated fire scenarios in the Control Room; at least one safe shutdown division would not be impacted by the fire. The inspectors reviewed the licensee's risk evaluation and based on the small calculated  $\Delta$ CDF and at least one safe shutdown train would not be affected by all postulated fire scenarios in the Control Room, the inspectors determined that the issue was of very low safety-significance.

The licensee entered this violation into its corrective action program as AR 01299460. The licensee submitted LER 05000461/2011-007-00 to report this issue. Refer to Section 4OA3.2 of this inspection report for the review and closure of the LER.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

R. Bair, Shift Operations Superintendent  
K. Baker, Regulatory Assurance Manager  
R. Bedford, Licensed Operator Requalification Lead Training Instructor  
J. Cunningham, Operations Director  
A. Darelus, Emergency Preparedness  
C. Dunn, Training Director  
R. Frantz, Regulatory Assurance  
M. Friedman, Radiation Protection Operations Manager  
N. Hightower, Radiation Protection Manager  
K. Leffel, Operations Support Manager  
D. Kemper, Engineering Director  
S. Kowalski, Senior Manager Design Engineering  
S. Mohundro, Engineering Programs Manager  
J. Mulvey, ODCM Program Owner  
W. Noll, Site Vice President  
S. O'Riley, Emergency Preparedness  
J. Peterson, Regulatory Assurance  
C. Rocha, Nuclear Oversight Manager  
R. Schenck, Work Management Director  
D. Shelton, Operations Services Manager  
D. Smith, Design Engineering  
J. Smith, Senior Manager Plant Engineering  
T. Stoner, Maintenance Director  
J. Stovall, Chemistry, Environmental & Radwaste Manager  
D. Szymkiewicz, Clinton Buried Piping Program Owner  
B. Taber, Plant Manager  
J. Ufert, Fire Marshall  
R. Zacholski, Nuclear Oversight Lead Assessor

**LIST OF ITEMS OPENED, CLOSED AND DISCUSSED**

Opened

05000461/2013-002-01	NCV	Incomplete ED Dose Rate Alarm Evaluation (Section 2RS1.1.b.(1))
05000461/2013-002-02	FIN	Failure to Perform Adequate Past Operability Evaluation (Section 4OA2.3.b(1))
05000461/2013-002-03	NCV	Failure to Perform Adequate MOV Preventive Maintenance Resulted in Inoperable RCIC System (Section 4OA2.3.b(2))

Closed

05000461/2013-002-01	NCV	Incomplete ED Dose Rate Alarm Evaluation (Section 2RS1.1.b.(1))
05000461/2013-002-02	FIN	Failure to Perform Adequate Past Operability Evaluation (Section 4OA2.3.b(1))
05000461/2013-002-03	NCV	Failure to Perform Adequate MOV Preventive Maintenance Resulted in Inoperable RCIC System (Section 4OA2.3.b(2))
05000461/2012-003-00	LER	Breaker Failure Leads to Loss of Safety Function and System Start (Section 4OA3.1)
05000461/2011-007-00	LER	Un-Fused DC Ammeter Circuits Result in Unanalyzed Condition (Section 4OA3.2)
05000461/2012-004-04	URI	Evaluation of High Pressure Core Spray Test Return Line Pipe Support Failure (Section 4OA5.2)
2515/187	TI	Inspection of Near-Term Task Force Recommendation 2.3 – Flooding Walkdowns (Section 4OA5.4)
2515/188	TI	Inspection of Near-Term Task Force Recommendation 2.3 – Seismic Walkdowns (Section 4OA5.5)

Discussed

None		
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## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety, but rather, that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

### 1R04 Equipment Alignment

- CPS 3312.01E001, "Residual Heat Removal Electrical Lineup," Revision 17
- CPS 3312.01V001, "Residual Heat Removal Valve Lineup," Revision 17a
- CPS 3319.01V002, "Residual Heat Removal Instrument Valve Lineup," Revision 9a
- CPS 3319.01V002, "Standby Gas Treatment Instrumentation Valve Lineup," Revision 5a
- CPS 3320.01, "Drywell Cooling System (VP)," Revision 21
- CPS 3320.01E001, "Drywell Cooling Electrical Lineup," Revision 11e
- CPS 3320.01V001, "Drywell Cooling Valve Lineup," Revision 10c
- EC 342362, "Application of an Electrical Jumper to 1VP010A(B)," Revision 0
- AR 01465040, "WS Pressure and VP 'B' Chiller Head Pressure and Amps Oscillating"
- AR 01282557, "1VP04CB: 'B' VP Chiller Oil Temperature Low Out of Specification"
- AR 01196024, "1VP04CA Oil Temperature Low"
- AR 01461265, "EIOD: 1VP10FB; High DP on VP 'B' Sidestream Filter"
- AR 01377984, "1WS066B (VP 'B' Temperature Control Valve) 120DPM Leak When Open"
- AR 01461258, "Change in Reactor Power After Swapping From VP 'A' to VP 'B'"
- M05-1109, "Drywell Chilled Water System (VP)," Sheet 002, Revision AA
- M05-1109, "Drywell Chilled Water System (VP)," Sheet 003, Revision Z

### 1R05 Fire Protection

- Clinton Power Station Updated Final Safety Analysis Report, Appendix E, "Fire Protection Evaluation Report – Clinton Power Station Unit 1," Revision 15
- Clinton Power Station Updated Final Safety Analysis Report, Appendix F, "Fire Protection Safe Shutdown Analysis – Clinton Power Station Unit 1," Revision 15
- OP-AA-201-009, "Control of Transient Combustible Material," Revision 11
- CPS 1893.04M803, "699 Screen House: 'A' (North) Fire Pump Room Prefire Plan," Revision 6
- CPS 1893.04M131, "781 Auxiliary (West): Div 2 Containment Electrical Penetrations Prefire Plan," Revision 5
- CPS 1893.04M121, "762 Auxiliary (East): Containment Electrical Penetrations Prefire Plan," Revision 5
- WO 01308153-01, "1H13P841: Unexpected Fire Protection Trouble Alarm Device 23-24"
- AR 01433859, "Evaluate Fire protection Annunciators for Main Control Room Nuisance Alarm"
- AR 01445581, "Erroneous Troubles from Carbon Dioxide Tanks"
- AR 01439544, "1CO04J: Carbon Dioxide Generator Exciter Fire Protection Testing Unsatisfactory"
- AR 01336662, "Nuclear Oversight Identified Unapproved Combustibles Stored in Fuel Building"
- AR 01271837, "Hydrant #31 Still Inoperable 1 year After Last Perform of 9071.22"
- AR 01158901, "Questions Raised by NRC Regarding Fire Protection"
- AR 01271849, "2-1/2" Fire Hose Catastrophically Failed – Near Miss"
- AR 01261577, "Turbine Building Roof Smoke Vents Failed to Open During 3822.10 Test"
- CC-AA-211, "Fire Protection Program," Revision 4



- OP-MW-201-007, "Fire Protection System Impairment Control," Revision 7
- CPS 1893.04M003, "Prefire Plan Legend," Revision 1
- CPS 1893.04M134, "781 Auxiliary (East): Division 1 Battery Room Prefire Plan," Revision 5
- CPS 1893.04M135, "781 Auxiliary (West): Division 2, Battery Room Prefire Plan," Revision 6
- CPS 1893.04M352, "781 Control: Division 1 Cable Spreading Room Prefire Plan," Revision 5

#### 1R06 Flood Protection

- A21-1011, "Special Door Schedule," Sheet 001, Revision M
- A21-1018, "Turbine Building Hollow Metal Door Schedule," Sheet 001, Revision 1
- A26-1000-02A, "Auxiliary Building," Sheet 001, Revision V

#### 1R11 Licensed Operator Regualification Program and Licensed Operator Performance

- CPS 3811.03, "Reactor Feed Pump Turbine Emergency Governor and Trip Mechanism Test," Revision 12

#### 1R12 Maintenance Effectiveness

- Clinton Power Station Updated Safety Analysis Report, Revision 15
- Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2
- NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2
- ER-AA-310, "Implementation of Maintenance Rule," Revision 8
- ER-AA-310-1001, "Maintenance Rule Scoping," Revision 4
- ER-AA-310-1004, "Maintenance Rule – Dispositioning Between (a)(1 and (a)(2)," Revision 6
- MA-AA-716-210, "Performance Centered Maintenance (PCM) Process," Revision 14
- MA-AA-716-210-1001, "Performance Centered Maintenance (PCM) Templates," Revision 9
- Equipment Apparent Cause Evaluation AR 01443700, "Failure of ABB K-Line Circuit Breaker 0AP06E4D (VC 'B' Chiller Breaker)," Revisions 0 and 1
- Equipment Apparent Cause Evaluation AR 01332256, "VC 'B' Chiller Relays Chattering," Revision 0
- Equipment Apparent Cause Evaluation AR 00437890, "0VC13CA: Received Unexpected Main Control Room Annunciator 5050-2L," Revision 0
- Failure Analysis Report CPS-35628, "Failure Analysis of (1) ABB K-600S Circuit Breaker," February 18, 2013
- (a)(1) Determination AR 01463694, "VC Exceeds Maintenance Rule Reliability Criteria"
- (a)(1) Determination AR 01398313, "VC System Requires a Maintenance Rule (a)(1) Determination"
- AR 01463694, "VC Exceeds Maintenance Rule Reliability Criteria"
- AR 01443700, "VC Chilled Water Chiller B Breaker, 0AP06E4D, Cycled to Failure"
- AR 01443678, "0AP06E4D: Breaker Cycled Continually"
- AR 01447408, "0VC13CB Guide Vane Actuator Failed to Move as Expected"
- AR 01398313, "VC System Requires a Maintenance Rule (a)(1) Determination"
- AR 01332256, "VC 'B' Chiller Relays Chattering"
- AR 01450373, "Maintenance Rule Components Allowed to Run-to-Failure"
- AR 01455829, "Verify Non-Critical Class 5, 6, 7 & 8 Relays Have MR [Maintenance Rule] PM [Preventive Maintenance] Evaluation"
- AR 00432079, "Received Main Control Room Annunciator 5050-2L Fail to Start VC System"
- AR 00437890, "0VC13CA: Received Unexpected Main Control Room Annunciator 5050-2L"

- AR 00441671, "0VC13CA: VC 1A Chiller Troubleshooting Follow Up Actions"
- AR 01462474, "Generate Work Order to Replaced Aged VC B Control Relays"

### 1R13 Maintenance Risk Assessments and Emergent Work Control

- ER-AA-600, "Risk Management," Revision 6
- ER-AA-600-1012, "Risk Management Documentation," Revision 9
- ER-AA-600-1014, "Risk Management Configuration Control," Revision 6
- ER-AA-600-1042, "On-Line Risk Management," Revision 7
- WC-AA-101, "On-Line Work Control Process," Revision 19
- WC-AA-104, "Integrated Risk Management," Revision 18
- OP-AA-108-117, "Protected Equipment Program," Revision 2
- WC-CL-201, "Contingency Planning," Revision 1
- CPS 3303.01, "Reactor Water Clean-Up," Revision 34b
- WO 1548698, "Reactor Water Clean-Up 'A' Regenerative Heat Exchanger Walkdown," March 18, 2013
- M05-1076, "Reactor Water Clean-Up (RT)," Sheet 001, Revision AC

### 1R15 Operability Evaluations

- NRC Regulatory Issue Summary 2005-20, "Revision to NRC Inspection Manual Part 9900 Technical Guidance, 'Operability Determinations & Functionality Assessments for Resolution of Degraded or Nonconforming Conditions Adverse to Quality or Safety,'" Revision 1
- NUREG 1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73," Revision 2
- EC 391269, "Evaluate Past Operability/Reportability of Division 1 Diesel Generator with As Found Heat Exchanger Bolt Torque Below Design Value," Revision 0
- WO 01577547-01, "Verify Readings and Replace Agastat Relay 1UAYAP567C"
- AR 01464933, "1PL12JA-A3 - Removed A3 Speed Device Unsatisfactory As-Found"
- AR 01418152, "Loose Bolting on Floating End of Division 1 DG Heat Exchangers"
- AR 01464933, "1PL12JA-A3 - Removed A3 Speed Device Unsatisfactory As-Found"
- AR 01424422, "Preliminary Part 21 From GE Hitachi on Main Steam Line Choke Flow"
- AR 01436642, "Inadequate Deletion of ORM Section 'Structural Integrity'"
- AR 01420789, "Clinton ORM 2.3.3 Change Similar to LaSalle TRM Change"
- AR 01444543, "Clarify Technical Specification Bases for Division 1/2 Diesel Generator 14 Day LCO [Limiting Condition for Operation]"
- AR 01447400, "0VC13CB: VC B Chiller Pre-Rotation Vanes Would Not Open"
- AR 01447408, "0VC13CB Guide Vane Actuator Failed to Move As Expected"
- AR 01361702, "Both Divisions of Leakage Detection Bypassed Reportability"
- AR 01455384, "Numerous Particles Floating on Suppression Pool Surface"
- AR 01418366, "1UAYAP567C: Unexpected Resistance Read Across Open Contacts"
- Engineering Change (EC) # 389012, "Control Room Habitability Analysis for Chlorine Release from Raw Water Treatment Facility," Revision 0
- WO 01607679, "EMD Visual Inspection of Armature Pivot Pins," January 16, 2013
- AR 01418388, "Discrepancy Noted with 1AP07E-D 250/251 (C) COM-5 Relay"
- AR 01461018, "ABB Part 21 On COM-5/SSC-T Protective Relays"
- AR 01486737, "Evaluate Restoration of Automatic VC High Chlorine Mode"

### 1R19 Post-Maintenance Testing

- WO 909659-03, "1C71AK614G PMT of Power Supply IAW CPS 8801.72 – 1H13P663 NSPS Power Supply"

- WO 909658-03, "Post Installation Testing of Power Supply IAW 8801.72 – 1H13P662 NSPS Power Supply"
- WO 01613252, "Breaker for 0AP57E-1B for 1VG06Yb Slow to Fully Open"
- AR 01343774, "Anomaly Identified in 1C11F002B Stroke"
- AR 01299441, "Recorded Values Above Post Mod Test Acceptance Criteria"
- AR 01400387, "Feedwater Perturbation During 1CP015B PMT"
- AR 01262936, "1E12F049 Failed to Close After Preventive Maintenance"
- AR 01262762, "PMT Failure of 1E12F049 Stroking"
- AR 01325055, "Inadequate PMT for Division 3 NSPS Power Supply – 1C71AK614G"
- AR 01471305, "Breaker for 0AP57E-1B for 1VG06Yb Slow to Fully Open"
- AR 01471851, "CPS 8801.72 Not Revised Per Recommended Action"
- AR 01482915, "1B13D008-08-13: CRD 08-13 Would Not Move Off Position 00"
- AR 01482774, "HCU 08-13 Position Indication"
- Apparent Cause Evaluation #1337989, "1RIXPR035 Detector Failure – Entry Into 4004.02 Loss of Vacuum"
- CPS 9437.61, "Post Treatment Off Gas System Process Radiation Monitor (PRM) 1RIX-PR035, (1RIX-PR041) Calibration Test," Revision 47b
- WO 01369548, "MOV Diagnostic Test 1E12-F003A," February 27, 2013
- WO 01379878, "Perform Thrust Verification and MOV Clean and Inspect 1FC024," January 29, 2013
- WO 01474335, "EP Contingent VT-2 PMT 9843.02 for 1E51-F061," January 25, 2013
- WO 01536441, "1RIXPR035: Troubleshoot and Repair Monitor Lock Up," February 22, 2013
- AR 01359165, "Create Work Order Tasks for EACE CAs on Radiation Monitors"
- AR 01457894, "Service Air Dryer Valve Maintenance Functional Check"
- AR 01458625, "Procedure Enhancement for Placing SA Dryers in Service"
- AR 01481065, "As Found Stem Lubrication Grease Grade 3"
- AR 01481911, "1E12-F003A: Geared Limit Switches Have Beacon Grease"

#### 1R20 Refueling and Other Outage Activities

- Clinton Power Station Technical Specifications
- OP-AA-108-108, "Unit Restart Review," Revision 13
- CPS 3001.01, "Preparation For Startup and Approach to Critical, Revision 25E
- CPS 3001.01C002, "Mode 2 Checklist," Revision 16d
- CPS 3001.01C001, "Preparation for Startup Checklist," Revision 18A
- CPS 3006.01, "Unit Shutdown," Revision 42
- OU-AA-103, "Shutdown Safety Management Program," Revision 12
- OU-CL-104, "Shutdown Safety Management Program Clinton Power Station," Revision 7
- AR 01484647, "1GS-SSAFV Will Not Maintain GS Pressure"
- AR 01484712, "SRM-B Experiencing Intermittent I/O Faults"
- AR 01484612, "SRM C Inoperable"
- AR 01484623, "1LSGC014 Generator Casing Coolant Level Switch Bullseye Full"
- AR 01484737, "Conductivity Indicator Reading High After Scram"
- AR 01485593, "Reactor Level 4 Runback During B TDRFP Manipulation"
- AR 01484852, "Hanger Support Disconnected"
- AR 01485592, "Bypass Valve Opened During Startup/Power Ascension"
- AR 01485546, "PMC: 1HD004A; Unexpected Change in MSR Drain Tank 1A Level"
- AR 01485587, "Recirculation Pump A Outer Seal Leakage Hi"
- AR 01485526, "1CP-MV5B Not Closed When Placing Condensate Polisher B Into Service"
- AR 01485516, "C1F54 LL – Manual Latching of AVR Contactor"
- AR 01485427, "1B21N509; LL C1F54 SJAE Recombiner Loss of Level Indication"

## 1R22 Surveillance Testing

- Clinton Power Station Technical Specifications
- Clinton Power Station Updated Final Safety Analysis Report, Revision 15
- Clinton Nuclear Power Station Unit 1, "Inservice Testing Program Plan – Third Ten Year Interval," Revision 3
- American Society of Mechanical Engineers / American National Standards Institute (ASME/ANSI) Code for Operation and Maintenance of Nuclear Power Plants (OM), 2004 Edition
- NUREG 1482, "Guidelines for Inservice Testing at Nuclear Power Plants," Revision 1
- EC 385398, "Acceptance Criteria for Comprehensive Pump Test Procedures," Revision 0
- CPS 9052.01, "LPCS/RHR A Pumps & LPCS/RHR A Water Leg Pump Operability," Revision 48
- CPS 9052.01D001, "LPCS/RHR A Pumps & LPCS/RHR A Water Leg Pump Operability Data Sheet," Revision 46
- IST Pump Evaluation Form Report #91, Pump 1E21-C001, December 7, 2007
- IST-CPS-BDOC-V-14, "Low Pressure Core Spray System Description – Third Interval," Revision 6
- IST Valve Evaluation Form Report #133, Valves VQ004A, VQ004B, VR001B, December 9, 2011
- IP-O-0076, "Technical Specification Indicator Loop Uncertainty Evaluation for H2 Recombiner, H2 Igniter & H2 Mixer. Surveillance Requirements 3.6.3.2.1 thru 4, 3.6.3.3.1 and 2, ORM TR 4.4.10.1, 4.4.10.3," Revision 0
- CPS 9068.01, "Hydrogen Mixing System Operability Test," Revision 35d
- CPS 1019.07, "Leakage Reduction and Monitoring Program," Revision 5
- CPS 1019.07D001, "Leakage Reduction Data Sheet," Revision 3
- WO 01354521-01, "OP 1019.07 Leak Reduction/Mon-PASS/RHR A S/D Cooling"
- WO 01354524-01, "OP 1019.07 Leak Reduction/Mon-PASS/RHR B S/D Cooling"
- WO 01437725-01, "OP 1019.07 VI Leak Reduction/Monitoring – RCIC"
- WO 01455119-01, "OP 1019.07 Leak Reduction/Monitoring – SM"
- WO 01262839-01, "OP 1019.07 VI of 0HG01SB, H2 Recombiner"
- WO 01266391-01, "OP 1019.07 VI of 0HG01SA, H2 Recombiner 'A'"
- WO 01335824-01, "OP 1019.07 Leak Reduction/Monitoring – LPCS in Full Flow Mode"
- WO 01354522-01, "OP 1019.07 VI \*Leak Reduction/Monitoring (RHR A S/D Cooling)"
- WO 01384686-01, "OP 1019.07 Leak Reduction/Mon-PASS/RHR 'A' in Supp Pool Cooling"
- WO 01437724-01, "OP 1019.07 Leak Reduction/Mon-PASS/RHR B in Supp Cooling"
- WO 01421671-01, "OP 1091.07 VI Leak Reduction/Monitoring-RHR B"
- WO 01422628-01, "OP 1019.07 Leak Reduction/Monitoring - RHR C"
- WO 01331002-01, "OP 1019.07 Leak Reduction/Monitoring – Gas Div II H2O2"
- WO 01372921-01, "OP 1019.07 Leak Reduction/Monitoring – CM"
- WO 01382559-01, "OP 1019.07 Leak Reduction/Monitoring – HPCS"
- AR 01472953, "IP-O-0076 Not Revised to Reflect Surveillance Change"
- AR 01492112, "Weaknesses Identified in CPS 1019.07 Documentation by NRC"
- CPA 9015.01, "Standby Liquid Control System Operability, " Revision 41
- CPA 9015.01D001, "Standby Liquid Control System Operability Data Sheet, " Revision 38a
- CPS 9051.01, "HPCS Pump and HPCS Water Leg Pump Operability," Revision 47
- CPS 9051.01D001, "HPCS Pump and HPCS Water Leg Pump Operability Data Sheet," Revision 48
- WO 01590078, "9015.01E23 Operations SLC Valve Operability (1C41-F001A and F001B only)," January 31, 2013
- WO 01592998, "HPCS Pump and HPCS Water Leg Pump Operability," January 17, 2013

- AR 01463781, "Procedure Change for 9051.01 (HPCS WLP/Pump Run)"

#### 2RS1 Radiological Hazard Assessment and Exposure Controls

- AR 01335298, "NRC Inspection Results in a URI"
- AR 01454976, "NRC Review of Extremity Dose Evaluation"
- LS-AA-125-003, "Apparent Cause Evaluation for Electronic Dosimetry Dose Rate Alarms Due to Contamination Build up on Gloves," April 23, 2012
- CPS-12-001, "Clinton Power Station Shallow Dose Equivalent Calculation," March 26, 2012
- RP-AA-203-1001, "Personnel Exposure Investigation," December 17, 2011
- RP-AA-203-1001, "Personnel Exposure Investigations," Revision 6
- RP-AA-210, "Dosimetry Issue, Usage, and Control," Revision 22

#### 2RS3 In-Plant Airborne Radioactivity Control and Mitigation

- N-AN-RP-3MVERSAFLO-USER," Instruction Guide for Use of the 3M Versaflo TR-300 Powered Air Purifying Respiratory (PAPR) System and Associated Head Gear," January 3, 2013
- GRP-3MPAPR, "Instruction Guide for Use of the 3M air Mate Hood and PAPR Blower Unit," February 20, 2012
- RP-AA-441, "Evaluation and Selection Process for Radiological Respirator Use," Revision 4
- RP-AA-825-1020, "Operation and Use of Air Line Supplied Respirators," Revision 0
- RP-AA-440, "Respiratory Protection Program," Revision 10
- RP-AA-870-1001, "Set-Up and Operation of Portable Air filtration Equipment," Revision 3
- Quarterly Service Air and Self Contained Breathing Apparatus Air Quality Results, Various Dates
- Premaire Regulatory Flow Test Maintenance Records, Various Dates
- AR 01297060, "C1R13LL RP ID Refuel Floor Airborne Condition," December 1, 2011
- AR 0124097, "Batteries in SCBA Kits Stored Outside May Exceed Temperature," July 18, 2011
- AR 01486736, "Grade 'D' Breathing Air Sample Results," March 12, 2013

#### 2RS4 Occupational Dose Assessment

- RP-AA-211, "Personnel Dosimetry Performance Verification," Revision 9
- RP-AA-222, "Methods for Estimating Internal Exposure from In Vivo and In Vitro Bioassay Data," Revision 3
- RP-AA-210, "Dosimetry Issue, Usage, and Control," Revision 22
- RP-AA-250, "External Dose Assessments from Contamination," Revision 5
- RP-AA-270, "Prenatal Radiation Exposure," Revision 6
- RP-AA-230, "Operation of the Canberra FastScan Whole Body Counter," Revision 1
- RP-AA-220, "Bioassay Program," Revision 8
- RP-AA-203-1001, "Personnel Exposure Investigations," Revision 6
- Effective Dose Equivalent for External Exposure Calculation Packages, for various individuals
- Committed Effective Dose Equivalent Calculation Packages, for various individuals
- Shallow Dose Equivalent Calculation Packages, for various individuals
- AR 01435302, "Criteria Not Met for Third Consecutive Quarter"
- AR 01405975, "RP FASA Identified WBC Deficiency"

#### 40A1 Performance Indicator Verification

- Nuclear Energy Institute 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6

#### 40A2 Identification and Resolution of Problems

- Common Cause Analysis AR 01398322, "NOS Elevation: Failure of Management to Ensure Causes of Issues Are Properly Identified and Resolved"
- Common Cause Analysis AR 01434370, "Radioactive Material Control and Storage"
- Common Cause Analysis AR 01423934, "Perform Common Cause Analysis to Address Equipment Failures Due to Forced Loss Rate and Critical Component Failures in Aggregate to Help Understand What Factors Are Causing These Equipment Failures"
- Common Cause Analysis AR 10419244, "ERO Drill Performance Deficiencies Requires Common Cause Analysis"
- Common Cause Analysis AR 01433892, "Common Cause Analysis of Issues Identified During Comprehensive Pump Tests"
- Common Cause Analysis AR 01406589, "NOS Identified Security Personnel Fail to Recognize and Identify Deficiencies"
- Common Cause Analysis AR 01398432, "Clinton Power Station Record Turnover Issues"
- Common Cause Analysis AR 01386858, "Review of Corrective Work and Preventive Maintenance Performed on the AR/PR Duct Monitor Group Over the Last 10 Years"
- Common Cause Analysis AR 01390016, "Reactivity Management Performance"
- Common Cause Analysis AR 01382882, "Clinton Power Station Operations Performance in Refueling Outage C1R13"
- Common Cause Analysis AR 01369824, "Determine Any Common Cause or Gaps Identified That May Have Existed During C1R12 and C1R13 With Respect to Local Leak Rate Testing Outage Issues"
- Common Cause Analysis AR 01377397, "Engineering Perform Common Cause Analysis on Procedure Adherence"
- Common Cause Analysis AR 01360504, "C1R13 Control Rod Hydraulic Control Unit Issues"
- Common Cause Analysis AR 01434042, "Chemistry Department Human Performance"
- Common Cause Analysis AR 01426655, "Common Cause Analysis on Gap in Operations Fundamentals"
- Common Cause Analysis AR 01465044, "2011 and 2012 CPS Configuration Control Events and Precursors"
- Common Cause Analysis AR 01465932, "Condensate Polishing System Pre-Filter and Polisher AOVs [Air Operated Valves]"
- Common Cause Analysis AR 01456903, "Critical PMs [Preventive Maintenance] Being Performed in the Second Half of Grace"
- Security Department Coding and Analysis Report, 4th Quarter 2012
- Engineering Department Coding and Analysis Report, 4th Quarter 2012
- Maintenance Department Coding and Analysis Report, 4th Quarter 2012
- Work Management Department Coding and Analysis Report, 4th Quarter 2012
- Chemistry Department Coding and Analysis Report, 4th Quarter 2012
- Radiation Protection Department Coding and Analysis Report, 4th Quarter 2012
- Operations Department Coding and Analysis Report, 4th Quarter 2012
- Nuclear Training Department Coding and Analysis Report, 4th Quarter 2012
- MA-AA-716-210, "Performance Centered Maintenance (PCM) Process," Revision 14
- MA-AA-716-210-1001, "Performance Centered Maintenance (PCM) Templates," Revision 9
- AR 01460640, "NRC Question MRFR for 1VX06CA/1SX024A, AR 1383458-03"

- AR 01383458, "No SX Flow Passing Through 1SX024A to 1VX06CA"
- AR 01383069, "1VX06CA Tripping on High Discharge Pressure"
- AR 01395861, "Perform EACE on 1SX024A"
- AR 01475341, "NRC Question Raw Water Piping OPEX for Clinton"
- AR 00239632, "Valve PCM Template Deficiencies"
- Equipment Apparent Cause Evaluation AR 01395861, "No Flow Passing Through 1SX024A," Revision 0
- NRC Information Notice "2010-03: Failures of Motor-Operated Valves Due to Degraded Stem Lubricant," February 3, 2010
- LER3-09-03, "Inoperable Containment Isolation Valve Results in Condition Prohibited by Technical Specifications"
- Apparent Cause Evaluation #1432993, "Inadequate MOV Stem Lubrication Practices," Revision 0
- Root Cause Evaluation #00892191, "Root Cause for MOV Degraded Grease and Performance Issues," April 21, 2009
- EC 371659, "Ultra-sonic Inspection Criteria: Division 2 ECCS: RHR-B/RHR-C," Revision 1
- EC 391444, "Evaluate Past Operability of 1E51F031 failure to shut during 9054.04, RCIC Automatic Suction Shift Test," Revision 1
- EC 391444, "Evaluate Past Operability of 1E51F031 failure to shut during 9054.04, RCIC Automatic Suction Shift Test," Revision 2
- Prompt Investigation #1081379, "2CS009B Did Not Stroke Close after being Stroked Open"
- Prompt Investigation #1432799, "1E51-F031 Failed to Close Electrically from MCR During 9054.04, RCIC Automatic Suction Shift Test"
- RH-816, "Residual Heat Removal Piping Isometric," Sheet 001, Revision 1
- OE 31994, "Motor Operated Valve Failed to Stroke Closed During System Alignment Activities"
- CPS 8451.05, "Corrective Maintenance for Limatorque SMB-000, SMB-00, & SB-00 Operators," Revision 11
- AR 00904946, "NER NC-09-014 Yellow Failure of MOVs Due to Hardened Grease"
- AR 01097085, "NER NC-10-047-Y Braidwood Failure Due to Degraded Stem Lube"
- AR 01323352, "Air Void Found on Line 1RH117A"
- AR 01397666, "Air Void Monitoring Results at Location RHB-7 Line 1RH117A2"
- AR 01432993, "Grade 4 Grease Found on Stem of 1E51F031"
- AR 01471199, "Air Void Monitoring Results at Location RHB-7 Line 1RH117A2"
- AR 01493457, "Need Operations Strategy for MOV Troubleshooting"
- AR 01495906, "1E51F031 – Past Operability Review"

#### 4OA3 Followup of Events and Notices of Enforcement Discretion

- Clinton Power Station Technical Specifications
- Clinton Power Station Updated Final Safety Analysis Report, Revision 15
- CPS 4100.01, "Reactor Scram," Revision 22
- CPS 4401.01, "[Emergency Operating Procedure] EOP-1 [Reactor Pressure Vessel] RPV Control," Revision 28
- LER 05000461/2012-003-00, "Breaker Failure Leads to Loss of Safety Function and System Start," January 17, 2013
- EN 48533, "Inadvertent Loss of Instrument Air," November 24, 2012
- Control Room Logs, November 23, 2013
- Equipment Apparent Cause Evaluation AR 01443700, "Failure of ABB K-Line Circuit Breaker 0AP06E4D (VC 'B' Chiller Breaker)," Revisions 0 and 1

- Failure Analysis Report CPS-35628, "Failure Analysis of (1) ABB K-600S Circuit Breaker," February 18, 2013
- AR 01443700, "VC Chilled Water Chiller B Breaker, 0AP06E4D, Cycled to Failure"
- AR 01443678, "0AP06E4D: Breaker Cycled Continually"
- AR 01487450, "4.0 Critique for Reactor Scram 3-7-13"
- AR 01484742, "Unexpected Annunciator 5006-1H HCU 08-45, 52-29, 48-45"
- AR 01484706, "Unexpected MCR Annunciator 5001-1A (Auto Trip Pump/Motor)"
- AR 01484549, "1MP05S-A30.2: Generator/Exciter Trouble Alarm"
- AR 01484624, "Reactor Scram Due to Generator Trip"
- AR 01484628, "MSR Drain Tank 1B Level High"
- AR 01484645, "Rod 16-37 Channel 2 Full In LED Not Lit"
- LER 05000461/2011-007-00, "Un-Fused DC Ammeter Circuits Result in Unanalyzed Condition," January 27, 2012
- CL-SDP-02, "Fire Risk Evaluation for CPS Un-Fused Ammeter Condition," February 25, 2013
- EC 387053, "CPS ENS 47510 Retraction Evaluation," Revision 1
- AR 01299460, "DC Ammeter Circuit Deficiency"

#### 4OA5 Other

- Operability Evaluation 1380555-02, "HPCS Test Return Line Hanger Damaged," Revision 0
- American Society of Mechanical Engineers (ASME) Boiler & Pressure Vessel Code, Section III, 1974 Edition, Subsection NE
- ASME Code Section III, Division 1- Article F-1000 Subsection NA, 1974
- Clinton Power Station Updated Final Safety Analysis Report, Revision 15
- CQD-4536-IPC0033, "Penetration Stress Analysis Report for Primary Containment Penetration 1PC0033," Revision 1
- DS-ME-09-CP, "Piping Penetration Assemblies Design Specification," Revision 15
- GE 762E454, "High Pressure Core Spray," Revision F
- M05-1074, "P&ID High Pressure Core Spray (HP)," Revision AH
- AR 01380555, "HPCS Test Return Line Hanger Damaged"
- AR 01417729, "NRC Containment Penetration Design Question"
- AR 01418557, "NRC Penetration Calculation Question"
- ER-AA-5400, "Buried Piping and Raw Water Corrosion Program (BPRWCP) Guide," Revision 5
- ER-AA-5400-1003, "Buried Pipe and Raw Water Corrosion Program (BPRWCP) Performance Indicators," Revision 4
- ER-AA-5400-1002, "Buried Piping Examination Guide," Revision 4
- Buried Pipe and Raw Water Systems, Long Term Asset Management (LTAM) Strategy, Revision 6
- CSI Report No. 0600. 105-03; "Buried Piping Risk-Analysis for Clinton Power Station," Revision 0
- LS-AA-126-1001, "FASA on Control Degradation of Underground Piping/Tanks (TI-182) NRC Phase II Inspection," Revision 7
- ER-AA-1100, "Implementing and Managing Engineering Programs," Revision 10
- NES-EIC-50.00, "Guideline for Performing Cathodic Protection (CP) System Survey," Revision 1
- ER-AA-335-004, "Ultrasonic (UT) Measurement of Material Thickness and Interfering Conditions," Revision 6
- NES-G-01, "Clinton Power Station Buried Piping Inspection Plan," Revision 1
- NES-MS-15.2, "Guidance for Determining Reasonable Assurance for Structural and/or Leakage Integrity for Buried Piping," Revision 0



- ER-AA-335-004, "Ultrasonic (UT) Measurement of Material Thickness and Interfering Conditions," Revision 6
- IMPro Technologies Procedure UT-SB, "NDE Procedure, Ultrasonic Examination – Straight Beam," January 1, 2008
- AR 01475791, "NRC Identified Inadequate NDE Documentation"
- WO 594629, "Perform VT-2 Examination of Class 3 SX Piping SX-VA-211, 111, 311"
- Corrpro Report No. 340600389, "2012 Cathodic Protection System Resurvey Report for Clinton Power Station," September 2012
- Technical Report No. AM 3042-423715, "Guided Wave Examination Results," September 10, 2012
- IMP-GWT-01N, "Long Range Guided Wave Ultrasonics Pipe Screening System," Revision 5
- AR 01478489, "NRC Identified BPRWCP Direct Examins May Have Been Inappropriately Credited"

## LIST OF ACRONYMS USED

ADAMS	Agency-wide Documents and Management System
ALARA	As Low As Reasonably Achievable
AR	Action Request
ASME	American Society of Mechanical Engineers
CDF	Core Damage Frequency
CFR	Code of Federal Regulations
CM	Centimeter
CNO	Chief Nuclear Officer
CPS	Clinton Power Station
DC	Direct Current
DG	Diesel Generator
ED	Electronic Dosimeter
EOP	Emergency Operating Procedure
HPCS	High Pressure Core Spray
IEEE	Institute of Electrical and Electronics Engineers
IMC	Inspection Manual Chapter
IN	Information Notice
IP	Inspection Procedure\
ISTS	Improved Standard Technical Specificaitons
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LPCS	Low Pressure Core Spray
MCR	Main Control Room
MOV	Motor Operated Valve
MREM/HR	Millirem per Hour
MSR	Moisture Separator Reheater
NEI	Nuclear Energy Institute
NCV	Non-Cited Violation
NRC	U.S. Nuclear Regulatory Commission
OP	Operations
PARS	Publicly Available Records
PCIV	Primary Containment Isolation Valve
PMT	Post Maintenance Testing
RCA	Radiological Controlled Area
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RPS	Reactor Protection System
SDE	Shallow-Dose Equivalent
SDP	Significance Determination Process
SLC	Standby Liquid Control
SSCs	Systems, Structures, and Components
SX	Shutdown Service Water
TI	Temporary Instruction
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VC	Control Room Ventilation
VF	Fuel Building Ventilation
WO	Work Order

M. Pacilio

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Sincerely,

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Robert J. Orlikowski, Acting Branch Chief  
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