



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

August 8, 2016

Mr. Thomas A. Vehec  
Vice President  
NextEra Energy Duane Arnold, LLC  
3277 DAEC Road  
Palo, IA 52324-9785

**SUBJECT: DUANE ARNOLD ENERGY CENTER—NRC INTEGRATED INSPECTION  
REPORT 05000331/2016002**

Dear Mr. Vehec

On June 30, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Duane Arnold Energy Center. On July 7, 2016, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The inspectors documented the results of this inspection in the enclosed inspection report.

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

If you contest the violation or significance of the NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with copies to: (1) the Regional Administrator, Region III; (2) the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and (3) the NRC Resident Inspector at the Duane Arnold Energy Center.

In addition, if you disagree with the cross-cutting aspect assignment to any finding 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 the Duane Arnold Energy Center.

T. Vehec

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In accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.390, "Public Inspections, Exemptions, Requests for Withholding," of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC's Public Document Room or from the Publicly Available Records System (PARS) component of the NRC's Agencywide Documents 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/**

K. Stoedter, Chief  
Branch 1  
Division of Reactor Projects

Docket No. 50-331  
License No. DPR-49

Enclosure:  
Inspection Report 05000331/2016002

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-331  
License No: DPR-49

Licensee: NextEra Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: Palo, IA

Dates: April 1 through June 30, 2016

Inspectors: C. Norton, Senior Resident Inspector  
J. Steffes, Resident Inspector  
C. Phillips, Project Engineer  
K. Carrington, Resident Inspector, Quad Cities  
J. Wojewoda, Reactor Engineer

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

Enclosure

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## SUMMARY

Inspection Report 05000331/2016002; 04/01/2016–06/30/2016; Duane Arnold Energy Center; Surveillance Testing.

This report covers a 3-month period of inspection by resident inspectors. One Green finding was self-revealed. This finding involved a Non-Cited Violation (NCV) of the U.S. Nuclear Regulatory Commission (NRC) requirements. The significance of inspection findings is indicated by their color (i.e., greater than Green, or Green, White, Yellow, Red) and determined using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process," dated April 29, 2015. Cross-cutting aspects are determined using IMC 0310, "Aspects Within the Cross-Cutting Areas," dated December 4, 2014. All violations of NRC requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated February 4, 2015. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG–1649, "Reactor Oversight Process," dated February 2014.

### **NRC-Identified and Self-Revealed Findings**

#### **Cornerstone: Mitigating Systems**

Green. A self-revealing finding of very low safety significance (Green) and associated NCV of Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified for the licensee's failure to accomplish surveillance test procedure (STP) 3.3.6.1-28, "[Reactor Core Isolation Cooling] RCIC Steam Line Flow HI Channel Functional Test." Specifically, on April 28, 2016, licensee personnel placed a relay block on the incorrect relay finger which when the relay was actuated, in accordance with the procedure, caused the steam supply to the RCIC system to isolate which resulted in an unplanned RCIC inoperability. Corrective actions included ceasing the performance of the STP, restoring the RCIC system to an operable status and performing an apparent cause evaluation. The apparent cause evaluation corrective actions included updated and expanded training on the proper implementation of place keeping and error reduction techniques.

Blocking the wrong relay contacts was a performance deficiency. The finding was more than minor because it affected the mitigating systems cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Although the finding constituted a loss of safety function, the finding was determined to be of very low safety significance (Green) because the three hours of system unavailability was less than the Technical Specification allowed outage time. Corrective actions included ceasing the performance of the STP, restoring the RCIC system to an operable status and performing an apparent cause evaluation. The apparent cause evaluation corrective actions included updated and expanded training on the proper implementation of place keeping and error reduction techniques. The finding was associated with the cross-cutting aspect of avoid complacency in the area of human performance because individuals failed to implement appropriate error reduction tools. [H.12] (Section 1R22)

## REPORT DETAILS

### Summary of Plant Status

Duane Arnold Energy Center (DAEC) was operating at full power at the beginning of the inspection period. On May 2, 2016, the licensee lowered power to approximately 62 percent to perform a control rod sequence exchange and load line adjustment. The station resumed full power operations on May 3, 2016. On June 5, 2016, the licensee lowered power to approximately 32 percent to perform a control rod sequence exchange, replace a reactor feed pump cartridge, perform condensate pump corrective maintenance, and investigate and isolate condenser tube leaks. Following restoration of those systems, the licensee gradually ascended in power and returned to full power operations on June 18, 2016. The plant remained at full power for the remainder of the inspection period with the exception of brief down-power maneuvers to accomplish rod pattern adjustments or planned surveillance testing activities.

### **1. REACTOR SAFETY**

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

#### 1R01 Adverse Weather Protection (71111.01)

##### .1 Readiness of Offsite and Alternate Alternating Current Power Systems

##### a. Inspection Scope

The inspectors verified that plant features and procedures for operation and continued availability of offsite and alternate alternating current (AC) power systems during adverse weather were appropriate. The inspectors reviewed the licensee's procedures affecting these areas and the communications protocols between the transmission system operator (TSO) and the plant to verify that the appropriate information was being exchanged when issues arose that could impact the offsite power system. Examples of aspects considered in the inspectors' review included:

- coordination between the TSO and the plant during off-normal or emergency events;
- explanations for the events;
- estimates of when the offsite power system would be returned to a normal state; and
- notifications from the TSO to the plant when the offsite power system was returned to normal.

The inspectors also verified that plant procedures addressed measures to monitor and maintain availability and reliability of both the offsite AC power system and the onsite alternate AC power system prior to or during adverse weather conditions. Specifically, the inspectors verified that the procedures addressed the following:

- actions to be taken when notified by the TSO that the post-trip voltage of the offsite power system at the plant would not be acceptable to assure the continued operation of the safety-related loads without transferring to the onsite power supply;
- compensatory actions identified to be performed if it would not be possible to predict the post-trip voltage at the plant for the current grid conditions;

- re-assessment of plant risk based on maintenance activities which could affect grid reliability, or the ability of the transmission system to provide offsite power; and
- communications between the plant and the TSO when changes at the plant could impact the transmission system, or when the capability of the transmission system to provide adequate offsite power was challenged.

Documents reviewed are listed in the Attachment to this report. The inspectors also reviewed corrective action program (CAP) items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures.

This inspection constituted one readiness of offsite and alternate AC power systems sample as defined in Inspection Procedure (IP) 71111.01–05.

b. Findings

No findings were identified.

.2 External Flooding

a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with the design basis probable maximum flood. The evaluation included a review to check for deviations from the descriptions provided in the Updated Final Safety Analysis Report (UFSAR) for features intended to mitigate the potential for flooding from external factors. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, checked that the roofs did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined that barriers required to mitigate the flood were in place and operable. Additionally, the inspectors performed a walkdown of the protected area to identify any modification to the site which would inhibit site drainage during a probable maximum precipitation event or allow water ingress past a barrier. The inspectors also walked down underground bunkers/manholes subject to flooding that contained multiple train or multiple function risk-significant cables. The inspectors also reviewed the abnormal operating procedure (AOP) for mitigating the design basis flood to ensure it could be implemented as written. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one external flooding sample as defined in IP 71111.01–05.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- reactor core isolation system (RCIC) with high pressure coolant injection (HPCI) system inoperable;
- “B” core spray (CS) system while “A” CS system and low pressure coolant injection function were inoperable;
- control rod drive system while the standby liquid control system was inoperable; and
- “A” Standby Diesel Generator (SBDG) while the “B” SBDG was unavailable during pre-planned maintenance.

The inspectors selected these systems based on their risk significance relative to the Reactor Safety Cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could impact the function of the system and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, UFSAR, Technical Specification (TS) requirements, outstanding work orders (WOs), condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions 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 and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

These inspections constituted four partial system walkdown samples as defined in IP 71111.04–05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

The inspectors conducted fire protection walkdowns which were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- reactor building elevation 757' (fire zones A, B, and D);
- reactor building elevation 855' (all fire zones);
- startup transformer, standby transformer and instrument air building elevation 757' (all fire zones);
- reactor building elevation 812' (all fire zones); and
- reactor building elevation 828' (all fire zones).

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and implemented adequate compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan.

The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event.

Using the documents listed in the Attachment to this report, 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; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP. Documents reviewed are listed in the Attachment to this report.

These inspections constituted five quarterly fire protection inspection samples as defined in IP 71111.05-05.

b. Findings

No findings were identified.

1R06 Flooding (71111.06)

.1 Internal Flooding

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 UFSAR, engineering calculations, and abnormal operating procedures to identify licensee commitments. The specific documents reviewed are listed in the Attachment to this report. 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 the licensee's corrective action documents with respect to past flood-related items identified in the corrective action program to verify the adequacy of the corrective actions. 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:

- HPCI room, Torus area, SBDG rooms and reactor building drain/sump systems; and
- “B” general service water cables degraded condition revealed during testing.

Documents reviewed during this inspection are listed in the Attachment to this report.

This inspection constituted two internal flooding samples as defined in IP 71111.06–05.

b. Findings

No findings were identified.

1R07 Annual Heat Sink Performance (71111.07)

.1 Heat Sink Performance

a. Inspection Scope

The inspectors reviewed the licensee’s testing of the “A” reactor building closed cooling water and the “A” residual heat removal and CS pump’s essential room cooler heat exchangers to verify that potential deficiencies did not mask the licensee’s ability to detect degraded performance, to identify any common cause issues that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors reviewed the licensee’s observations as compared against acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. Inspectors also verified that test acceptance criteria considered differences between test conditions, design conditions, and testing conditions. Documents reviewed for this inspection are listed in the Attachment to this document.

This annual heat sink performance inspection constituted one sample as defined in IP 71111.07–05.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

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

a. Inspection Scope

On May 6, 2016, the inspectors observed a crew of licensed operators in the plant’s simulator during licensed operator requalification training. The inspectors verified that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and that training was being conducted in accordance with licensee procedures. 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 annunciator alarms;
- correct use and implementation of abnormal and emergency procedures;
- control board manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications.

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one quarterly licensed operator requalification program simulator sample as defined in IP 71111.11-05.

b. Findings

No findings were identified.

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

a. Inspection Scope

On May 2, 2016, the inspectors observed a downpower for control rod sequence exchange. On June 5, 2016, the inspectors observed an infrequent and significant downpower. The licensee was required to:

- perform a control rod sequence exchange;
- remove the condensate and reactor feed pumps from service for maintenance; and
- perform condenser chloride intrusion mitigation actions.

These were activities that required heightened awareness or was related to increased 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 annunciator alarms (if applicable);
- correct use and implementation of procedures;
- control board (or equipment) manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications (if applicable).

The performance in these areas was compared to pre-established operator action expectations, procedural compliance and task completion requirements. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one quarterly licensed operator heightened activity/risk sample as defined in IP 71111.11–05.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk-significant systems:

- “A” reactor recirculation pump motor generator scoop tube lock-up; and
- heating, ventilation and air conditioning system associated with the SBDGs.

The inspectors reviewed events such as where ineffective equipment maintenance had resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- implementing appropriate work practices;
- identifying and addressing common cause failures;
- scoping of systems in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 50.65(b) of the maintenance rule;
- characterizing system reliability issues for performance;
- charging unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, and components (SSCs)/functions classified as (a)(2), or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the CAP with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

This inspection constituted two quarterly maintenance effectiveness samples as defined in IP 71111.12–05.

b. Findings

No findings 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 the 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:

- work week 1614 – “A” residual heat removal pump and “A” residual heat removal service water (RHRSW) train planned maintenance outage;
- emergent repair of “A” control building chiller and “A” river water supply (RWS) isolation valve solenoid replacement;
- work week 1619 – “B” SBDG and “B” essential service water (ESW) planned outage, site power transformer (T3) unavailability and severe weather in the area;
- critical maintenance management work window for the HPCI system;
- risk associated with backup instrument air compressor maintenance; and
- secondary containment isolation logic testing with concurrent RWS pit diving.

These activities were selected based on their potential risk significance relative to the Reactor Safety Cornerstones. As applicable for each activity, the inspectors verified that risk assessments were performed as required by 10 CFR 50.65(a)(4) and were accurate and complete. When emergent work was performed, the inspectors verified that the plant risk was promptly reassessed and managed. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed TS requirements and walked down portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met.

Documents reviewed during this inspection are listed in the Attachment to this report.

These inspections constituted six maintenance risk assessments and emergent work control samples as defined in IP 71111.13–05.

### b. Findings

No findings were identified.

## 1R15 Operability Determinations and Functionality Assessments (71111.15)

### .1 Operability Evaluations

#### a. Inspection Scope

The inspectors reviewed the following issues:

- licensee actions for a HPCI drain pot high level alarm following surveillance testing;
- automatic depressurization system logic operability during CS simulated automatic actuation surveillance testing;

- “A” RWS operability review following an isolation valve American Society of Mechanical Engineers (ASME) timing failure; and
- shaft seal leak discovered on the HPCI pump and its potential programmatic impact on leakage outside containment.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and USFAR to the licensee’s evaluations to determine whether the components or systems were operable. 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 evaluations. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment to this report.

These inspection constituted four operability evaluation samples as defined in IP 71111.15–05.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

The inspectors reviewed the following modification:

- severe accident capable hardened containment vent system modification.

The inspectors reviewed the configuration changes and associated 10 CFR 50.59 safety evaluation screening against the design basis, the UFSAR, and the TS, as applicable, to verify that the modification did not affect the operability or availability of the affected system. The inspectors, as applicable, observed ongoing and completed work activities to ensure that the modifications were installed as directed and consistent with the design control documents; the modifications operated as expected; post-modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modifications did not impact the operability of any interfacing systems. As applicable, the inspectors verified that relevant procedure, design, and licensing documents were properly updated. Lastly, the inspectors discussed the plant modification with operations, engineering, and training personnel to ensure that the individuals were aware of how the operation with the plant modification in place could impact overall plant performance. Documents reviewed are listed in the Attachment to this report.

The inspection of the hardened containment vent system was considered a continuation of the partial sample documented in IR 05000331/2016001, Section 1R18.1.a, since the modification was scheduled for installation over several inspection periods.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- operability test of HPCI following scheduled maintenance outage;
- “A” RWS power operated valve testing following solenoid valve replacement;
- “B” condensate pump testing following seal repacking activities;
- “A” reactor feed pump testing following cartridge replacement; and
- “A” SBDG operability test following scheduled maintenance outage.

These activities were selected based upon the structure, system, or component's ability to impact risk. The inspectors evaluated these activities for the following (as applicable): the effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed; acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate; tests were performed as written in accordance with properly reviewed and approved procedures; equipment was returned to its operational status following testing (temporary modifications or jumpers required for test performance were properly removed after test completion); and test documentation was properly evaluated. The inspectors evaluated the activities against TSs, the UFSAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the CAP and that the problems were being corrected commensurate with their importance to safety. Documents reviewed are listed in the Attachment to this report.

This inspection constituted five post-maintenance testing samples as defined in IP 71111.19-05.

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the test results for the following activities to determine whether risk-significant systems and equipment were capable of performing their intended safety

function and to verify testing was conducted in accordance with applicable procedural and TS requirements:

- operability surveillance test of RHRSW (In-service Testing);
- essential bus 1A3 4 kilovolt emergency bus undervoltage relay calibration (Routine);
- post accident sampling system valve position indicator verification (Routine);
- steamline flow Hi-functional test of RCIC steam supply system (Routine);
- drywell to torus vacuum breaker surveillance test (Routine);
- "A" CS system automatic actuation surveillance test (Routine); and
- drywell to suppression chamber vacuum breaker operability test (Routine).

The inspectors observed in-plant activities and reviewed procedures and associated records to determine the following:

- did preconditioning occur;
- the effects of the testing were adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- acceptance criteria were clearly stated, demonstrated operational readiness, and were consistent with the system design basis;
- plant equipment calibration was correct, accurate, and properly documented;
- as-left setpoints were within required ranges; and the calibration frequency was in accordance with TSs, the UFSAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used;
- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and reference values were consistent with the system design basis;
- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;
- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and
- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report.

This inspection constituted six routine surveillance testing samples, and one in service test sample, as defined in IP 71111.22, Sections–02 and–05.

b. Findings

Failure to Accomplish a Surveillance Test Procedure in Accordance with Instructions Resulting in Safety System Inoperability

Introduction. A self-revealing finding of very-low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” was identified for the licensee’s failure to accomplish surveillance test procedure (STP) 3.3.6.1–28, “[Reactor Core Isolation Cooling] RCIC Steam Line Flow High Channel Functional Test,” Revision 14. Specifically, on April 28, 2016, licensee personnel placed a relay block on the incorrect relay finger which when the relay was actuated, in accordance with the procedure, caused the steam supply to the RCIC system to isolate which resulted in an unplanned RCIC inoperability.

Description. On April 28, 2016, an unplanned inoperability of RCIC occurred during the performance of STP 3.3.6.1–28, “RCIC Steam Line Flow High Channel Functional,” Revision 14. In Step 7.3.2.c of the STP, technicians blocked open contacts 9–10 of relay E51A–K33 instead of contacts 7–8. This caused in an inadvertent trip of the RCIC turbine trip throttle valve and an unplanned RCIC inoperability when a test signal was later applied.

Analysis. The inspectors determined that blocking the incorrect relay contacts while performing Step 7.3.2.c of STP 3.3.6.1–28 was a performance deficiency. The performance deficiency was determined to be more than minor safety significance in accordance with Inspection Manual Chapter (IMC) 0612, Appendix B, “Issue Screening,” dated September 7, 2012, because it affected the mitigating systems cornerstone objective to ensure availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency resulted in the tripping of the RCIC turbine trip throttle valve which resulted in the unplanned inoperability of the safety-related system.

The inspectors applied IMC 0609, Attachment 4, “Initial Characterization of Findings,” issued June 19, 2012, to this finding. The inspectors answered “No” to all questions within Table 3, “SDP Appendix Router,” and transitioned to IMC 0609, Appendix A, “The Significance Determination Process (SDP) for Findings At-Power,” issued June 19, 2012. Per Exhibit 2, “Mitigating Systems Screening Questions,” the inspectors determined that a detailed risk assessment was required because the inoperability and unavailability of RCIC constituted a loss of safety function. A risk evaluation was performed by a Region III Senior Reactor analyst who determined the finding screened as very low safety significance (Green) because the safety function was only lost for 3 hours which was significantly less than the TS allowed outage time.

The inspectors determined that the performance characteristic of the finding that was the most significant causal factor of the performance deficiency was associated with the cross-cutting aspect of avoid complacency in the human performance cross-cutting area, and involved individuals to implement appropriate error reduction tools. Specifically, the licensee failed to implement the error reduction tool of concurrent verification during

the execution of the critical step to place the relay finger block to prevent RCIC system inoperability. [H.12]

Enforcement. Title 10 CFR 50, Appendix B, Criterion V, “Instructions, Procedures, and Drawings,” required, 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.

Contrary to the above, on April 28, 2016, the licensee failed to accomplish STP 3.3.6.1–28 in accordance with prescribed instructions. Specifically, in Step 7.3.2.c of the procedure, the licensee blocked relay contacts 9–10 of relay E51A–K33 instead of contacts 7–8 resulting in RCIC becoming inoperable when a test signal was later applied.

Corrective actions included ceasing the performance of the STP, restoring the RCIC system to an operable status and performing an apparent cause evaluation. The apparent cause evaluation corrective actions included updated and expanded training on the proper implementation of place keeping and error reduction techniques.

Because the violation was of very low safety significance (Green) and the issue was entered into the licensee CAP as condition report (CR) 2128559, consistent with Section 2.3.2 of the Enforcement Policy, it is being treated as an NCV. **(NCV 05000331/2016002–01, Failure to Accomplish a Surveillance Test Procedure in Accordance with Instructions Resulting in Safety System Inoperability)**

#### 4. OTHER ACTIVITIES

**Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Security**

##### 40A1 Performance Indicator Verification (71151)

###### .1 Reactor Coolant System Leakage

###### a. Inspection Scope

The inspectors sampled licensee submittals for the Reactor Coolant System (RCS) Leakage performance indicator (PI) for the period from the second quarter 2015 through the first quarter 2016. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute (NEI) Document 99–02, “Regulatory Assessment Performance Indicator Guideline,” Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee’s operator logs, RCS leakage tracking data, issue reports, event reports and NRC Integrated Inspection Reports for the period of April 1, 2015, to March 31, 2016, to validate the accuracy of the submittals. The inspectors also reviewed the licensee’s issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one reactor coolant system leakage sample as defined in IP 71151–05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Items Entered into the Corrective Action Program

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify they were being entered into the licensee's CAP at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Attributes reviewed included: identification of the problem was complete and accurate; timeliness was commensurate with the safety significance; evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent-of-condition reviews, and previous occurrences reviews were proper and adequate; and that the classification, prioritization, focus, and timeliness of corrective actions were commensurate with safety and sufficient to prevent recurrence of the issue. Minor issues entered into the licensee's CAP as a result of the inspectors' observations are included in the Attachment to this report.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's CAP. This review was accomplished through inspection of the station's daily condition report packages.

These daily reviews were performed by procedure as part of the inspectors' daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings were identified.

### .3 Semi-Annual Trend Review

#### a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 4OA2.2 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the 6-month period of January 1, 2016, through June 30, 2016, although some examples expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the normal CAP in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's CAP trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

In October 2015, the inspectors identified a finding of very low safety significance for the licensee's failure to follow the NextEra procedure for temporary configuration changes. The licensee used a minor work order to construct a shaft housing enclosure on the "B" condensate pump which directly lead to water intrusion of the lower bearing oil system. This finding was documented in DAEC NRC Integrated Inspection Report 05000331/2015004 (ML16035A054) Section 1R18.1.b, "Failure to Follow Temporary Configuration Control Procedure." The inspectors subsequently reviewed licensee activities from January 2016 to June 2016 in order to assess the effectiveness of corrective actions associated with this finding.

In May 2016, the licensee's nuclear oversight organization identified that the line organization had used the maintenance process to place jumpers or lift leads to disable alarms or other similar functions due to failed inputs. Nuclear Oversight (NOS) identified an open work order tied to a repair work order under which the line organization had documented a lifted lead for a failed safety relief valve temperature element. Lifting the lead cleared a control room alarm and allowed the other safety relief valves to generate high tailpipe temperature alarms. As a corrective action to the NOS finding, the licensee's line organization classified the lifted lead as a temporary modification in accordance with EN-AA-205-1102, "Temporary Configuration Changes," Revision 6.

In June 2016, following a run of the electric fire pump, a failed relay in an unrequired circuit of the pump start logic caused the electric fire pump to restart after the stop pushbutton was released. The line organization lifted a lead to the failed logic relay which allowed the electric fire pump to stop and start as designed. The line organization controlled the lifted lead in accordance with the NextEra process for temporary configuration changes. The inspectors assessed that the licensee appeared to have an improving trend in recognizing and controlling temporary plant configuration changes in accordance with EN-AA-205-1102. The licensee line organization appeared to have taken a leadership role in applying the NextEra temporary configuration change process.

This review constituted one semi-annual trend inspection sample as defined in IP 71152–05.

b. Findings

No findings were identified.

.4 Annual Follow-up of Selected Issues: Misapplication of the Maintenance Process

a. Inspection Scope

The inspectors performed a review of the licensee’s CAP and associated documents to assess the adequacy of the licensee’s evaluation and corrective actions associated with the misapplication of the maintenance process.

The inspector’s review was predominately focused on:

- the adequacy of the licensee’s identification, documentation, classification and prioritization of the safety significance of the condition;
- the adequacy of the licensee’s casual evaluation as determined from the classification and prioritization; and
- the adequacy of the licensee’s extent of condition and cause evaluation.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152–05.

b. Background

On May 20, 2016, site NOS identified that an input lead to a control room temperature recorder from a failed safety relief valve tailpipe temperature element was lifted using a minor work request and documented this in CR 02133253. This was done so that input from the failed temperature element would not mask alarm signals from the other safety relief valve tailpipe temperature elements. The site NOS identified that this lifted lead constituted a temporary modification that was not controlled by the NextEra temporary configuration change process and as such a violation of 10 CFR 50, Appendix B Criterion III, Design Control, because the change was not controlled commensurate with design control measures applied to the original design. This was a minor violation because the performance deficiency could not reasonably be viewed as a precursor to a significant event.

Corrective actions included: immediately bringing the lifted lead into the compliance with NextEra temporary configuration change process; clarifying maintenance guidance to preclude misapplication of the maintenance process for temporary configuration changes; and determining if other such misapplications of the maintenance process existed.

c. Observations

The licensee demonstrated that self-assessments and audits are effective at identifying issues which are evaluated and resolved commensurate with their significance. In June 2016, the line organization used the NextEra temporary configuration change process to lift a lead that allowed the electric fire pump to function as designed after a

relay in an unrequired portion of the pump start logic had failed causing the pump to restart after the stop push button was released.

d. Findings

No findings were identified.

.5 Annual Follow-up of Selected Issues: Tritium Mitigation

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized corrective action items documenting the corrective action for increased tritium levels discovered in a monitoring well.

The licensee identified a new tritium leak that resulted in voluntary communications with State and Local Officials as described in NEI 07-07 (See EN #51863). The licensee, with the support of Radiological Safety and Control Services (RSCS), determined the leak was likely from turbine drains and/or the equipment drain sump and developed a mitigation strategy. These suspected sources were isolated and the plume was reduced using an extraction well. Water from the extraction well was pumped back to the plant, processed, and used for plant make-up water and successfully reduced groundwater tritium concentrations and reduced the likelihood of contamination leaving site. The licensee placed several new perimeter wells and another extraction well that appears to have prevented the plume from leaving site.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152-05.

b. Findings

No findings were identified.

.6 Annual Follow-up of Selected Issues: Failed Components Discovered During Maintenance

a. Inspection Scope

In October 2015, the inspectors identified a finding of very low safety significance, with two examples, and an associated NCV of TS Sections 3.3.5.1, Condition D and 3.3.5.2, Condition D, for failure to initiate required TS action statements 3.3.5.1.D.1 and 3.3.5.2.D.1. Specifically, the licensee failed to declare the HPCI and the RCIC systems inoperable when the automatic HPCI/RCIC pump suction swap function on low condensate storage tank level was revealed to be inoperable during surveillance testing. The licensee entered the inspectors concerns into the CAP as CR 2080489 and replaced the failed time delay relay. Corrective actions included training shift operating crews on the need to stop and initiate corrective actions when the as found conditions of components fall outside acceptable ranges.

In April 2016, the inspectors observed technicians performing a surveillance on a temperature transmitter for the "A" standby filter unit. When the technicians were unable to confirm the required acceptance criterion for the transmitter, they backed out of the

surveillance and informed shift management. Shift management declared the standby filter unit inoperable and wrote a condition report to document the concern and initiate corrective actions. The licensee subsequently replaced the temperature transmitter, and returned the standby filter unit to an operable status. This provided an example of effective corrective actions to implement lessons learned from an earlier violation.

This review constituted one in-depth problem identification and resolution sample as defined in IP 71152–05.

b. Findings

No findings were identified.

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

.1 Momentary Breaches of Secondary Containment

a. Inspection Scope

The inspectors reviewed the plant's response to momentary breaches of secondary containment. The licensee notified the NRC operations center as appropriate for each momentary breach of secondary containment. The licensee took action to address hardware and human performance deficiencies. Documents reviewed are listed in the Attachment to this report.

This event follow-up review constituted one sample as defined in IP 71153–05.

b. Findings

No findings were identified.

.2 Emergency Operating Procedure 3 (Secondary Containment Control) Entry

a. Inspection Scope

On May 26, 2016, the licensee entered AOP 903, Severe Thunderstorm Warning. Subsequently, reactor building supply ventilation fan 1VSF10A tripped on thermal overload. This resulted in the steam tunnel ambient temperature to increase above the max normal. The licensee entered Emergency Operating Procedure (EOP) 3 but did not declare an Emergency Action Level because the steam tunnel temperature above max normal was not due to RCS leakage. The licensee successfully restarted the reactor building supply ventilation fan, lowered steam tunnel temperature to below max normal, and exited EOP 3.

This event follow-up review constituted one sample as defined in IP 71153–05.

b. Findings

No findings were identified.

.3 (Closed) Licensee Event Report 05000331/2015-002-01, Unanalyzed Condition Due to Degraded Primary Containment Suppression Pool Coating

The licensee reported in License Event Report (LER) 05000331/2015-002 an Unanalyzed Condition Due to Degraded Primary Containment Suppression Pool Coating pursuant to the requirements of 10 CFR 50.73(a)(2)(ii)(B). On January 28, 2016, the licensee reported to the NRC in Supplement 01 to LER 05000331/2015-002 that the suppression pool degraded condition further represented a condition prohibited by TS, 10 CFR 50.73(a)(2)(i)(B), an event or condition that alone could have prevented a loss of safety function 10 CFR 50.73(a)(2)(v)(B) and (D), and a common cause inoperability of independent trains or channels, 10 CFR 50.73(a)(2)(vii). The inspectors reviewed LER 05000331/2015-002-01 against reporting requirements and found no issues. No additional findings or violations of NRC requirements were identified in this supplemental report. Documents reviewed are listed in the Attachment to this report. This LER is closed.

This event follow-up review constituted one sample as defined in IP 71153-05.

4OA5 Other Activities

.1 Institute of Nuclear Power Operations Plant Assessment Report Review

a. Inspection Scope

The inspectors reviewed the final report for the Institute of Nuclear Power Operations plant evaluation conducted in April 2016. The inspectors reviewed the report to ensure that issues identified were consistent with the NRC perspectives of licensee performance and to verify if any significant safety issues were identified that required further NRC follow-up.

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On July 7, 2016, the inspectors presented the inspection results to you and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

T. Vehec, Site Vice President  
P. Hansen, Plant General Manager  
S. Brown, Site Engineering Director  
M. Davis, Licensing Manager  
M. Fritz, Emergency Preparedness Manager  
B. Simmons, Nuclear Oversight Manager  
R. Wheaton, Operations Director  
D. Morgan, Radiation Protection Manager  
M. Casey, Chemistry Manager  
J. Schwertfeger, Security Manager  
C. Hill, Training Manager  
B. Murrell, Licensing Senior Engineer  
L. Swenzinski, Licensing Senior Engineer  
P. Collingsworth, System Engineering  
D. Church, Engineering Programs Manager

#### U.S. Nuclear Regulatory Commission

K. Stoedter, Chief, Reactor Projects Branch 1  
M. Chawla, Project Manager, NRR

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

05000331/2016002-01	NCV	Failure to Accomplish a Surveillance Test Procedure in Accordance with Instructions Resulting in Safety System Inoperability (Section 1R22)
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### Closed

05000331/2016002-01	NCV	Failure to Accomplish a Surveillance Test Procedure in Accordance with Instructions Resulting in Safety System Inoperability (Section 1R22)
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### Discussed

None.

## LIST OF DOCUMENTS REVIEWED

The following is a partial list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspector 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.

### 1R01 Adverse Weather Protection

- AOP 304; Grid Instability; Revision 43
- Apparent Cause Evaluation (ACE) 02106338; Discrepancy Between DAEC and ITC MVAR Indications; Revision 2
- Administrative Control Procedure (ACP) 101.16; Midwest ISO: Communication and Mitigation Protocols for Nuclear Plant/Electric System Interfaces (DAEC Site-Specific Information for RTO-OP-03); Revision 8
- Operating Procedure (OP)-AA-102-1002; Seasonal Readiness; Revision 13
- CR 02134222; Grid Transient on May 23, 2016
- CR 02135564; ITC Work Conflict with Summer Reliability Plan
- AOP 902; Flood; Revision 54
- WO 40382752-01; Inventory Flood Material per AOP 902, Flood
- BECH-MRS-M513; Watertight Flood Gate (Door-124B); Revision 0
- Drawing BECH-C004<1>; Flood Protection Details; Revision 2
- Drawing BECH-C004<2>; Flood Protection Details; Revision 1
- Drawing BECH-C004<3>; Flood Protection Details; Revision 2
- Drawing BECH-C004<4>; Flood Protection Details; Revision 2
- CR 02123557; Water Noted in "A" [Standby Diesel Generator] SBDG Room
- CR 02123292; Safety – Rain Water Found on Floor in 1G31 "A" SBDG Room
- CR 02123384; Seal Openings in "A" SBDG Room
- CR 02123053; Potential Coating Degradation Pumphouse Exterior at Dig Site

### 1R04 Equipment Alignment

- OP-AA-102-1003; Guarded Equipment; Revision 7
- Operating Instruction (OI) 150A2; Reactor Core Isolation System (RCIC) Valve Lineup and Checklist; Revision 13
- OI 324A3; SBDG 1G-31 System Valve Lineup and Checklist; Revision 12
- OI 324A7; SBDG 1G-31 System Control Panel Lineup; Revision 6
- STP 3.8.1-04A; "A" Standby Diesel Generator Operability Test (Slow Start from Normal Start Air); Revision 23;
- OI 324A10; SBDG Standby/Readiness Condition Checklist; Revision 19
- CR 02083515; Condition of SV7002A SBDG [Damper Operator] DO [Solenoid Valve] SV may be getting worse
- CR 02063768; V32-0047 did not meet ASME requirements during STP 3.8.1-11B
- OI 151A1; Core Spray (CS) System Electrical Lineup; Revision 4
- OI 151A4; "B" CS System Valve Lineup and Checklist; Revision 5
- Drawing BECH-M121; P. &I.D. Core Spray System; Revision 40
- OI 255A1; Control Rod Drive System Electrical Lineup; Revision 4
- OI 255A2; Control Rod Drive System Valve Lineup and Checklist; Revision 6
- OI 255A3; Control Rod Drive System HCU [Hydraulic Control Unit] Valve Lineup and Checklist; Revision 2

- Drawing BECH-M117; P. & I.D. Control Rod Drive Hydraulic System; Revision 64
- Drawing BECH-M118; P. & I.D. Control Rod Drive Hydraulic System Sheet 2; Revision 27

#### 1R05 Fire Protection

- ACP 1203.53; Fire Protection; Revision 18
- ACP 1412.4; Impairments to Fire Protection Systems; Revision 77
- Pre-Fire Plan (PFP)-RB-757; Pre-Fire Plan Reactor Building Elevation 757; Revision 1
- PFP-RB-855; Pre-Fire Plan Reactor Building Elevation 855; Revision 1
- PFP-OE-757; Pre-Fire Plan OAG-PA East Elevation 757; Revision 1
- PFP-OS-757; Pre-Fire Plan OAG-PA South Elevation 757; Revision 1
- PFP-RB-828; Pre-Fire Plan Reactor Building EL. 828; Revision 1

#### 1R06 Flooding

- AOP 902; Flood; Revision 54
- AOP 905; Turbine Building Internal Flooding; Revision 1
- ACP 1411.29; Draining Systems and Components/Floor Drain Plugging; Revision 14
- Drawing BECH-M139; P. & I.D. Floor Drain Radwaste System (Open); Revision 64
- Drawing BECH-M137<1>; P. & I.D. Radwaste Sump System; Revision 38
- Drawing BECH-M138<1>; P. & I.D. Equipment Radwaste System (Closed); Revision 28
- WO 40354834-01; STP NS690101 Liquid Radwaste System Leakage Inspection
- WO 40393010-01; STP NS690101 Liquid Radwaste System Leakage Inspection
- CR 02118857; "B" [General Service Water] GSW Cable [Insulation Resistance] IR Readings Less than 10 Mega-ohm
- CR 02121839; Missed Cable Evaluation
- CR 02040927; Conduit Inspection Results for Conduit 2K221
- IEEE 384-1981; Standard Criteria for Independence of Class 1E Equipment and Circuits; February 20, 1981
- CR 02119806; Replace 5 kV Power Cables to 1P089B-M "B" GSW Pump Motor
- DAEC System Level Performance Criteria Basis Document – General Service Water System SUS 11.01; Revision 3
- Electrical Cable Program (ECPM) Section 3.0; Cable Program Inspection/Test Population Selection; Revision 5
- ECPM Section 4.5; Electrical Cable Operability; Revision 7
- ECPM Section 4.8; Actions for Failed or Degraded Cables; Revision 5
- WO 40321927-01; 1P089B-M; Inspect Conduits and Dewater as Necessary
- ACP 1210.8; Electrical Cables and Connections Inspection Procedure; Revision 2

#### 1R07 Annual Heat Sink Performance

- WO 40386362-01; Division 1 Residual Heat Removal and CS Pump Room (Southeast Corner Room) Cooling Unit Reactor Building Southeast Corner Room Heating and Ventilation Platform (Elevation 747 feet)
- WO 40390405-01; 1E035A ["A" Reactor Building Closed Cooling Water (RBCCW) Heat Exchanger]: Open, Clean and Inspect Heat Exchanger
- WO 40390404-01; Perform ["A" RBCCW Heat Exchanger] Eddy Current Testing on Designated Tubes

#### 1R11 Licensed Operator Requalification Program

- OP-AA-100-1000; Conduct of Operations; Revision 15

- AD-AA-100-1006; Procedure and Work Instruction Use and Adherence; Revision 5
- OP-AA-103-1000; Reactivity Management; Revision 4
- STP 3.1.3-01; Control Rod Exercise; Revision 1
- Reactivity Management Plan; Downpower for Control Rod Exercise and Maintenance; June 2016
- Simulator Exercise Guide PDA OPS ESG 184; Revision 0
- OI 644; Condensate and Feedwater Systems; Revision 166

#### 1R12 Maintenance Effectiveness

- ER-AA-100-2002; Maintenance Rule Program Administration; Revision 2
- CR 02059125; Perform Duane Arnold Maintenance Rule (a)(3) Assessment
- NUMARC 93-01; Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants; Revision 4A
- PI-AA-104-1000; Condition Reporting; Revision 10
- ER-AA-204-2005; Critical Equipment Failure Evaluation; Revision 6
- PI-AA-100-1008; Condition Evaluation; Revision 9
- ER-AA-100-2002; Maintenance Rule Program Administration; Revision 2
- CR 02054842; SV7000A Continuously Porting Air
- CR 02054843; SV7002A Continuously Porting Air
- CR 02083515; Condition of SV7002A SBDG DO SV may be getting Worse
- CR 02081799; Exhaust Damper for 1V-SF-21 did not Open after Starting Fan
- ARP 1C23B; "B" SBDG 1G-21 Room Temperature High; Revision 23
- Drawing BECH-M170; P.&I.D. Heating Vent & Air Conditioner Misc. Control Systems; Revision 42
- Equipment Apparent Cause Evaluation 02081799; Exhaust Damper for 1V-SF-21 did not Open after Starting Fan
- DAEC Performance Criteria Basis Document; Emergency Diesel Generator and the Technical Support Center Diesel Generator SUS 23.00, 24.01, 24.02, 24.03, 24.04; Revision 7
- Initial Troubleshooting Investigation 02081799; Exhaust Damper for 1V-SF-21 did not Open after Starting Fan
- Equipment by SUS for Systems 23.00 (SBDG fuel oil), 24.01 (SBDG), 24.02 (SBDG electrical), and 24.03 (SBDG HVAC)
- CR 02136377; "A" [Reactor] Recirculation Pump] [Motor Generator] MG Set Scoop Tube Lock
- CR 02122616; "A" Recirculation] MG Set Scoop Tube Lock
- CR 02010840; "A" Recirculation] MG Set Scoop Tube Lock Unexpectedly
- CR 02136380; "A" Recirculation] MG Scoop Tube Lock
- Condition Evaluation 02122616; "A" Recirculation Pump MG Set Scoop Tube Lockout Failed to Reset

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

- Work Planning Guideline-1; Work Process Guideline; Revision 64
- Work Planning Guideline-2; Online Risk Management Guideline; Revision 69
- OP-AA-104-1007; Online Aggregate Risk; Revision 4
- WM-AA-1000; Work Activity Risk Management; Revision 4
- OP-AA-102-1003; Guarded Equipment; Revision 14
- MA-AA-100-1005; Conduct of Diving Operations; Revision 4
- Work Week 1614 Work Activity Risk Management (WARM) Summary and Weekly Probabilistic Risk Analysis (PRA); Revision 0

- AOP 410; Loss of River Water Supply/High River Bed Elevation/Low River Water Depth; Revision 28
- OI 410; River Water Supply System; Revision 72
- System Description 304; Electrical Power Systems; Revision 19
- CR 02061300; AOP 410 Entry, River Bed Elevation at 727.4 FT
- CR 02063623; Incorrect System Guarded
- STP 3.3.6.1–27; RCIC [Reactor Core Isolation Cooling] Steam Line Flow-High Channel Calibration; Revision 9 and 10
- STP 3.5.1–08; HPCI System Inoperable; Revision 2
- CR 02063672; I&C STPs Need Improvement Flowing In and Out of ESMPs [Electronic Systems Maintenance Procedures]
- CR 02063675; 3.3.6.1–27–RCIC Steam Line Flow-High Channel Calibration
- CR 02063941; Mitigating Actions for Orange Online Risk Management
- Maintenance Directive (MD) 052; Approved Pipe Thread Sealants; Revision 3
- WO 40463937–02; SV4935: Replace Solenoid Valve
- CR 02130052; Cable for SV4935 is Becoming Too Short to Support Solenoid Valve Replacement
- CR 02129870; Question Relating to Use of Loctite Thread Sealant PST580
- CR 02129237; “A” Control Building Chiller Tripped
- Work Week 1619 Work Activity Risk Management (WARM) Summary and Weekly Probabilistic Risk Analysis (PRA); Revision 0
- WO 40379366–01; V46–0018 [B ESW Pump Discharge Check Valve]: Disassembly and Inspect
- WO 40464626–01; T3 [Site Power Transformer], Add Oil to Low Side Bushings
- WO 40390871–01; 1A411 [“B” SBDG Feeder Breaker to 1A4 Essential Bus]: Install Remote Racking System per EC [Engineer Change] 283707
- WO 40362962–01; PCV7000B [“B” SBDG Room Pressure HVAC Controller]: Replacement
- CR 2137612; Determined that Failure Documented in CR 2134065 Constitutes a Condition Monitoring Failure

#### 1R15 Operability Determinations and Functionality Assessments

- EN–AA–203–1001; Operability Determinations/Functionality Assessments; Revision 20
- OP–AA–105–1000; Operational Decision-Making; Revision 1
- MA–AA–100–1011–F01; Initial Troubleshooting Investigation for CR 02064123 for MO2239 loss of position indication; August 1, 2015
- ACP 1410.2; LCO Tracking and Safety Function Determination Program; Revision 33
- CR 02064123; Loss of Position Indication for MO2239
- CR 2125833; 1P216 [High Pressure Coolant Injection] HPCI Main Pump Outboard Shaft Seal Leak
- Adverse Condition Monitoring Plan – HPCI Pump Shaft Seal Leakage
- Containment Leak Test Program (CLTP) 2.1; Containment Leakage Test Program Primary Coolant Sources Outside Containment Program; Revision 0
- STP NS520001; HPCI System Leakage Inspection Walkdown; Revision 23
- MA–AA–1000; Plant Leak Management Procedure; Revision 7
- CR 02129071; CV4915 [“A” River Water Supply to Stilling Basin Isolation Valve] Failed Its ASME Opening Time Per NS100104
- BECH–MRS–M010A; Design Specification for River Water Supply Pumps; Revision 5
- STP 3.6.1–09B; “B” Primary Containment Isolation, Groups 2 and 4, Logic System Functional Test; Revision 4

### 1R18 Plant Modifications

- OI 695.1; Hydrogen Seal Oil; Revision 18
- Clearance 9500-1PO94
- WO 40417619-04; Hydrogen Seal Oil Vacuum Pump
- EC 281991; Fukushima HCVS Project; Torus Rigging Plan

### 1R19 Post-Maintenance Testing

- MD-024; Post Maintenance Testing Program; Revision 80
- MD-062; Work Order Task(s); Revision 10
- STP 3.8.1-06A; "A" Standby Diesel Generator Operability Test (Fast Start); Revision 20
- OI 324A9; Standby Diesel Generator Checklist; Revision 12
- WO 40416988-01; Return to Service Work Order for A Standby Diesel Generator Week 1543
- WO 40297132-01; V32-0047 [1K-10B "B" Standby Diesel Generator AC Motor Driven Air Compressor Discharge Check Valve to 1T-115B Air Receiver]: Replace Valve with Resilient Seat Valve
- STP 3.8.1-11B; "B" Standby Diesel Generator Air Compressor and Air Start Check Valve Tests; Revision 9
- OI 695.1; Hydrogen Seal Oil; Revision 18
- Clearance 9500-1PO94
- WO 40417619-04; Hydrogen Seal Oil Vacuum Pump
- WO 40396963-01; STP 3.5.1-05 HPCI System Operability Test
- STP NS100104; River Water Supply Power Operated Valve Testing; Revision 0
- WO 40381810-01; SUS 24.03: Functional Check of "B" SBDG Room HVAC System
- WO 40401814-01; STP 3.8.1-04B, "B" Standby Diesel Generator Operability Test
- WO 40459279-01; Repack Condensate Pump
- WO 40353402-48; Reactor Feed Pump, Post Maintenance Data Collection for IP001A During Power Accession

### 1R22 Surveillance Testing

- ACP 107; Surveillance Tests; Revision 19
- STP 3.3.3.2-02; Remote Shutdown Panel Functional Test for Division 2 Switchgear and "B" SBDG; Revision 16
- STP 3.8.1-06B; "B" Standby Diesel Generator Operability Test (Fast Start); Revision 22
- OI 324A9; SBDG Operating Checklist; Revision 12
- OI 324A10; SBDG Standby/Readiness Condition Checklist; Revision 18
- OI 324; Standby Diesel Generator System; Revision 117
- CR 02059993; "B" SBDG Oil Leak
- STP 3.3.3.2-03; Remote Shutdown Panel Functional Test for Core Spray and Instrumentation; Revision 21
- CR 02061661; Evaluate STPs That Have Us Enter and Exit Equipment LCOs
- STP 3.6.1.7-01; Drywell - Suppression Chamber Vacuum Breaker Operability Test, Revision 5
- CR 2126348; Vacuum Breaker Did Not Move During STP
- CR 2098055; CV4327G and CV4327F ["G" and "F" Drywell to Suppression Pool Vacuum Breaker Valves] Slow During STP 3.6.1.7-01
- WO 40461373-01; Troubleshoot CV-4327G Test Circuit
- STP NS160002A; "A" RHRSW Operability Test; Revision 8
- WO 40399051-01; STP 3.3.8.1-04-A 4 kV Emergency Gus Undervoltage Relay Calibration

- CR 02130131; NRC Identified: Portion of Cabinet Seal Missing on Cabinet 1C351
- WO 40388697-01; STP 3.3.3.1-09 Post Accident Sampling System Valve Position Indicator Verification
- STP3.3.6.1-28; RCIC Steam Line Flow – High Channel Functional Test; Revision 14
- CR 2128855; RCIC Steam Line Flow Hi Flow Functional Test Should Have Been High Risk
- STP 3.5.1-03; “A” Core Spray System Simulated Auto Actuation; Revision 11
- WO 40402246; “A” Core Spray System Simulated Auto Actuation

#### 40A1 Performance Indicator Verification

- DAEC MSPI Basis Document; Revision 17

#### 40A2 Identification and Resolution of Problems

- OP-AA-100-1002; Plant Status Control Management; Revision 9
- PI-AA-100-1005; Root Cause Analysis; Revision 15
- PI-AA-100-1006; Common Cause Evaluation; Revision 12
- PI-AA-100-1007; Apparent Cause Evaluation; Revision 16
- PI-AA-103; Human Performance Program; Revision 13
- PI-AA-103-1000; Human Performance Program Error Reduction Tools; Revision 5
- PI-AA-104-1000; Condition Reporting; Revision 11
- OP-AA-101-1000; Clearance and Tagging; Revision 16
- CR 2100619; Difference Between Temperature Indications During STP 3.7.4-05A
- ARP 1C26A A-3; ASFU inlet Air Low Heat; Revision 50
- BECH-M173; P&ID & Air Flow Diagram Standby Filter Unit Control Building; Revision 58
- Bech-E113<099>; Heating and Ventilation System; Revision 10
- Bech-E113<060>; Heating and Ventilation System; Revision 11
- WO 40440954-02 TT 7311A: Calibrate
- ACE 2124644-01; New Source of Tritium Determined by RSCS Activities

#### 40A3 Follow-Up of Events and Notices of Enforcement Discretion

- STP 3.6.4.1-02; Secondary Containment Airlock Verification; Revision 15
- Event Notification Work Sheet; EN# 5202
- CR 2138930; 2 Secondary Containment Doors Momentarily Open
- CR 2141149; Momentary Breach of Secondary Containment Due to Two Reactor Building Railroad Doors Open at the Same time
- CR 2141393; Secondary Containment Airlock System-Parts Unavailable-Antiquated Design
- AOP 903; Severe Thunderstorm Warning; Revision 58
- EOP 3; Secondary Containment Control; Revision 21

#### 40A5 Other Activities

- WANO Peer Review Report, NextEra Energy, Duane Arnold, NextEra Energy, Inc., June 20, 2016

## LIST OF ACRONYMS USED

AC	Alternating Current
ACE	Apparent Cause Evaluation
ACP	Administrative Control Procedure
ADAMS	Agencywide Document Access Management System
AOP	Abnormal Operating Procedure
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
CS	Core Spray
DAEC	Duane Arnold Energy Center
DRP	Division of Reactor Projects
ECPM	Electrical Cable Program
EOP	Emergency Operating Procedure
ESW	Emergency Service Water
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
LER	Licensee Event Report
MD	Maintenance Directive
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NOS	Nuclear Oversight
NRC	U.S. Nuclear Regulatory Commission
OI	Operating Instruction
OP	Operating Procedure
PARS	Publicly Available Records System
PFP	Pre-Fire Plan
PI	Performance Indicator
RBCCW	Reactor Building Closed Cooling Water
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RHRSW	Residual Heat Removal Service Water
RSCS	Radiological Safety and Control Services
RWS	River Water Supply
SBDG	Standby Diesel Generator
SDP	Significance Determination Process
STP	Surveillance Test Procedure
TS	Technical Specification
TSO	Transmission System Operator
UFSAR	Updated Final Safety Analysis Report
WO	Work Order

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Sincerely,

*/RA/*

K. Stoedter, Chief  
Branch 1  
Division of Reactor Projects

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