



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

November 6, 2017

EA-17-174

Mr. Dean Curtland  
Director of Site Operations  
NextEra Energy Duane Arnold, LLC  
3277 DAEC Road  
Palo, IA 52324-9785

**SUBJECT: DUANE ARNOLD ENERGY CENTER—NRC INTEGRATED INSPECTION  
REPORT 05000331/2017003 AND EXERCISE OF DISCRETION**

Dear Mr. Curtland:

On September 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Duane Arnold Energy Center. On October 12, 2017, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings were identified during this inspection. A violation related to the main steam isolation valve pathway leakage rate was identified. However, the NRC is exercising enforcement discretion by not issuing enforcement action for the underlying Technical Specification 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)" violation based upon no associated performance deficiency and other factors as discussed within the report.

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

Sincerely,

**/RA/**

Laura Kozak, Acting Chief  
Branch 1  
Division of Reactor Projects

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

Enclosure:  
Inspection Report 05000331/2017003

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Letter to Dean Curtland from Laura Kozak dated November 6, 2017

SUBJECT: DUANE ARNOLD ENERGY CENTER NRC INTEGRATED INSPECTION  
REPORT 05000331/2017003

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000331/2017003

Licensee: NextEra Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: Palo, IA

Dates: July 1 through September 30, 2017

Inspectors: C. Norton, Senior Resident Inspector  
J. Steffes, Resident Inspector  
J. Cassidy, Senior Health Physicist  
V. Myers, Senior Health Physicist

Approved by: L. Kozak, Acting Chief  
Branch 1  
Division of Reactor Projects

Enclosure

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## **SUMMARY**

Inspection Report 05000331/2017003, 07/01/2017 – 09/30/2017; Duane Arnold Energy Center; Routine Integrated Inspection Report and Exercise of Discretion.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. All violations of U.S. Nuclear Regulatory Commission (NRC) requirements are dispositioned in accordance with the NRC's Enforcement Policy, dated November 1, 2016. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 6.

### **NRC-Identified Findings and Violations**

None.

## REPORT DETAILS

### Summary of Plant Status

Duane Arnold Energy Center (DAEC) operated at full power at the beginning of the inspection period. On July 11, 2017, the 'B' recirculation pump tripped and the licensee commenced single recirculation loop operations at 65 percent power. On July 13, 2017, the licensee lowered power to 50 percent, restarted the 'B' recirculation pump, and increased the reactor to full power on July 14, 2017. On August 26, 2017, the licensee lowered power to 70 percent to perform a control rod sequence exchange and returned to full power on August 27, 2017. 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 test activities.

### 1. REACTOR SAFETY

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

#### 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 cooling system while high pressure coolant injection (HPCI) system was inoperable;
- reactor building closed cooling water system;
- 'A' emergency service water (ESW) system while the 'B' residual heat removal service water (RHRSW) system was unavailable for planned maintenance; and
- 'B' emergency diesel generator (EDG) while 'A' EDG was inoperable.

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, Updated Final Safety Analysis Report (UFSAR), Technical Specification (TS) requirements, outstanding work orders, condition reports (CR), 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 corrective action program (CAP) with the appropriate significance characterization. Documents reviewed are listed in the Attachment to this report.

These activities constituted four partial system walkdown samples as defined in Inspection Procedure (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 716 (fire zones 1–B, 1–D, 1–E, 1–F and 1–H);
- turbine building elevation 757 and radioactive release (fire zones 8–A, 8–D and 8–E);
- control building elevation 786 and elevation 800; and
- pump house.

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 activities constituted four quarterly fire protection inspection samples as defined in IP 71111.05–05.

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 August 8, 2017, 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 July 11, 2017, the inspectors observed the control room operators response to a loss of the 'B' reactor recirculation pump due to an electrical fault. This was an activity 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;
- 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.

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:

- actions for declining river water supply flow trend; and
- control rod drive pump trend.

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* (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/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 1728 risk evaluation with ongoing 'B' recirculation pump recovery activities; and
- work activities evaluation during yellow plant risk condition while the standby liquid control, 'A' EDG, 'A' ESW and 'A' RHRSW systems were inoperable.

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 maintenance risk assessments and emergent work control activities constituted two samples as defined in IP 71111.13-05.

b. Findings

No findings were identified.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- 'D' RHRSW pump discharge isolation valve stem-to-disc separation found during system maintenance window;
- licensee's decision to reestablish Emergency Operating Procedure (EOP) 3 re-entry criteria following the loss of the 'B' reactor recirculation pump;
- reactor core isolation and HCPI cooling suction swap time delay relay found out of specification;
- HCPI inboard steam isolation valve operability;

- spent resin tank room area radiation monitor alarm and EOP 3 entry; and
- spent resin tank room alarm functionality determination and compensatory measure inspection.

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 UFSAR 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.

This operability inspection constituted six 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(s):

- temporary power supply to motor control center motor control center 1B64;
- curb removal on refuel floor; and
- instrument air jumper.

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(s). 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.

This inspection constituted two temporary modification samples and one permanent plant modification sample as defined in IP 71111.18–05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- cable spreading room carbon dioxide system functional test following extended maintenance window;
- tighten lug for loose wire on 'B' control building chiller/instrument air compressor;
- torque jacket cooling water cylinder number 11 upper flange on the 'B' EDG;
- reactor building damper maintenance;
- 125 volts direct current ground detector delay; and
- 'A' general service water pump replacement and auto vent.

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 Technical Specifications (TS), the Updated Final Safety Analysis Report (UFSAR), 10 CFR 50 requirements, licensee procedures, and various U.S. Nuclear Regulatory Commission (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 six 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:

- 'A' RHRSW operability test procedure (In-Service Test);
- Control Rod Sequence Exchange and Turbine Testing (Routine);
- 'B' Containment Atmosphere Monitoring/Post Accident Sample System Leakage Inspection (Routine); and
- 'A' emergency service water system 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 in-service 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 corrective action program (CAP).

Documents reviewed are listed in the Attachment to this report.

This inspection constituted three routine surveillance testing samples, and one in-service test sample as defined in Inspection Procedure (IP) 71111.22, Sections–02 and–05.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstones: Occupational and Public Radiation Safety**

2RS5 Radiation Monitoring Instrumentation (71124.05)

.1 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors assessed select portable survey instruments that were available for use for current calibration and source check stickers, and instrument material condition and operability.

The inspectors observed licensee staff demonstrate performance checks of various types of portable survey instruments. The inspectors assessed whether high-range instruments responded to radiation on all appropriate scales.

The inspectors walked down area radiation monitors and continuous air monitors to determine whether they were appropriately positioned relative to the radiation sources or areas they were intended to monitor. The inspectors compared monitor response with actual area conditions for selected monitors

The inspectors assessed the functional checks for select personnel contamination monitors, portal monitors, and small article monitors to verify they were performed in accordance with the manufacturer's recommendations and licensee procedures.

These inspection activities constituted one complete sample as defined in IP 71124.0–05.

b. Findings

No findings were identified.

.2 Calibration and Testing Program (02.03)

a. Inspection Scope

The inspectors assessed laboratory analytical instruments used for radiological analyses to determine whether daily performance checks and calibration data indicated that the frequency of the calibration was adequate and there were no indications of degraded instrument performance. The inspectors assessed whether appropriate corrective actions were implemented in response to indications of degraded instrument performance.

Inspectors reviewed select containment high-range monitor calibration and assessed whether an electronic calibration was completed for all range decades, with at least one decade at or below 10 rem/hour, calibrated using an appropriate radiation source, and calibration acceptance criteria was reasonable.

The inspectors reviewed select monitors used to survey personnel and equipment for unrestricted release to assess whether the alarm setpoints were reasonable under the circumstances to ensure that licensed material was not released from the site. The inspectors reviewed the calibration documentation for each instrument selected and discussed the calibration methods with the licensee to determine consistency with the manufacturer's recommendations.

The inspectors reviewed calibration documentation for select portable survey instruments, area radiation monitors, and air samplers. The inspectors reviewed detector measurement geometry and calibration methods for portable survey instruments and area radiation monitors calibrated on-site and observed the licensee demonstrate use of the instrument calibrator. The inspectors assessed whether appropriate corrective actions were taken for instruments that failed performance checks or were found significantly out of calibration, and that the licensee had evaluated the possible consequences of instrument use since the last successful calibration or performance check.

The inspectors reviewed the current output values for instrument calibrators. The inspectors assessed whether the licensee periodically measured calibrator output over the range of the instruments used with measuring devices that have been calibrated by a facility using National Institute of Standards and Technology traceable sources and corrective factors for these measuring devices were properly applied in its output verification.

The inspectors reviewed the licensee's Title 10 of the *Code of Federal Regulations* (CFR) Part 61, "Licensing Requirements for Land Disposal of Radioactive Waste," source term to assess whether calibration sources used were representative of the types and energies of radiation encountered in the plant.

These inspection activities constituted a partial sample as defined in IP 71124.05–05.

b. Findings

No findings were identified.

.3 Problem Identification and Resolution (02.04)

a. Inspection Scope

The inspectors evaluated whether problems associated with radiation monitoring instrumentation were being identified by the licensee at an appropriate threshold and were properly addressed for resolution. The inspectors assessed the appropriateness of the corrective actions for a selected sample of problems documented by the licensee that involve radiation monitoring instrumentation.

These inspection activities constituted one complete sample as defined in IP 71124.05–05.

b. Findings

No findings were identified.

2RS6 Radioactive Gaseous and Liquid Effluent Treatment (71124.06)

.1 Walkdowns and Observations (02.02)

a. Inspection Scope

The inspectors walked down select effluent radiation monitoring systems to evaluate whether the monitor configurations aligned with offsite dose calculation manual (ODCM) descriptions and to observe the material condition of the systems.

The inspectors walked down selected components of the gaseous and liquid discharge systems to evaluate whether equipment configuration and flow paths align with plant documentation and to assess equipment material condition. The inspectors also assessed whether there were potential unmonitored release points, building alterations, which could impact effluent controls, and ventilation system leakage that communicated directly with the environment.

For equipment or areas associated with the systems selected for review that were not readily accessible, the inspectors reviewed the licensee's material condition surveillance records.

The inspectors walked down filtered ventilation systems to assess for conditions such as degraded high-efficiency particulate air/charcoal banks, improper alignment, or system installation issues that would impact the performance or the effluent monitoring capability of the effluent system.

As available, the inspectors observed selected portions of the routine processing and discharge of radioactive gaseous effluent to evaluate whether appropriate treatment equipment was used and the processing activities aligned with discharge permits.

The inspectors determined if the licensee has made significant changes to their effluent release points.

As available, the inspectors observed selected portions of the routine processing and discharging of liquid waste to determine if appropriate effluent treatment equipment was being used and that radioactive liquid waste was being processed and discharged in accordance with procedure requirements and aligned with discharge permits.

These inspection activities constituted one complete sample as defined in IP 71124.06-05.

b. Findings

No findings were identified.

.2 Calibration and Testing Program (02.03)

a. Inspection Scope

The inspectors reviewed calibration and functional tests for select effluent monitors to evaluate whether they were performed consistent with the ODCM. The inspectors assessed whether National Institute of Standards and Technology traceable sources were used, primary calibration represented the plant nuclide mix, secondary calibrations verified the primary calibration, and calibration encompassed the alarm set points.

The inspectors assessed whether effluent monitor alarm set points were established as provided in the ODCM and procedures.

The inspectors evaluated the basis for changes to effluent monitor alarm set points.

These inspection activities constituted one complete sample as defined in IP 71124.06–05.

b. Findings

No findings were identified.

.3 Sampling and Analyses (02.04)

a. Inspection Scope

The inspectors reviewed select effluent sampling activities and assessed whether adequate controls had been implemented to ensure representative samples were obtained.

The inspectors reviewed select effluent discharges made with inoperable effluent radiation monitors and assess whether controls were in place to ensure compensatory sampling was performed consistent with the ODCM and that those controls were adequate to prevent the release of unmonitored effluents.

The inspectors determined whether the facility was routinely relying on the use of compensatory sampling in lieu of adequate system maintenance.

The inspectors reviewed the results of the inter-laboratory comparison program to evaluate the quality of the radioactive effluent sample analyses and assessed whether the inter-laboratory comparison program included hard-to-detect isotopes as appropriate.

These inspection activities constituted one complete sample as defined in IP 71124.06–05.

b. Findings

No findings were identified.

.4 Instrumentation and Equipment (02.05)

a. Inspection Scope

The inspectors reviewed the methodology used to determine the effluent stack and vent flow rates to determine if the flow rates were consistent with plant documentation, and that differences between assumed and actual stack and vent flow rates did not affect the results of the projected public doses.

The inspectors assessed whether surveillance test results for Technical Specification (TS) required ventilation effluent discharge systems met TS acceptance criteria.

The inspectors assessed calibration and availability for select effluent monitors used for triggering emergency action levels or for determining protective action recommendations.

These inspection activities constituted one complete sample as defined in IP 71124.06–05.

b. Findings

No findings were identified.

.5 Dose Calculations (02.06)

a. Inspection Scope

The inspectors reviewed significant changes in reported dose values compared to the previous radiological effluent release report to evaluate the factors, which may have resulted in the change.

The inspectors reviewed radioactive liquid and gaseous waste discharge permits to assess whether the projected doses to members of the public were accurate.

Inspectors evaluated the isotopes that are included in the source term to assess whether analysis methods were sufficient to satisfy detectability standards. The review included the current Part 61 analyses to ensure hard-to-detect radionuclides are included in the source term.

The inspectors reviewed changes in the licensee's offsite dose calculations to evaluate whether changes were consistent with the ODCM and Regulatory Guide 1.109. Inspectors reviewed meteorological dispersion and deposition factors used in the ODCM and effluent dose calculations to evaluate whether appropriate factors were being used for public dose calculations.

The inspectors reviewed the latest Land Use Census to assess whether changes have been factored into the dose calculations.

For select radioactive waste discharges, the inspectors evaluated whether the calculated doses were within the 10 CFR 50, Appendix I and TS dose criteria.

The inspectors reviewed select records of abnormal radioactive waste discharges to ensure the discharge was monitored by the discharge point effluent monitor. Discharges made with inoperable effluent radiation monitors, or unmonitored leakages were reviewed to ensure that an evaluation was made to account for the source term and projected doses to the public.

These inspection activities constituted one complete sample as defined in Inspection Procedure (IP) 71124.06–05.

b. Findings

No findings were identified.

.6 Problem Identification and Resolution (02.07)

a. Inspection Scope

Inspectors assessed whether problems associated with the effluent monitoring and control program were being identified by the licensee at an appropriate threshold and were properly addressed for resolution. In addition, they evaluated the appropriateness of the corrective actions for a selected sample of problems documented by the licensee involving radiation monitoring and exposure controls.

These inspection activities constituted one complete sample as defined in IP 71124.06–05.

b. Findings

No findings were identified.

**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 Mitigating Systems Performance Index—Emergency AC Power System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI)—Emergency AC Power System performance indicator (PI) for the period from the third quarter 2016 through the second quarter 2017. 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 narrative logs, MSPI derivation reports, condition reports (CR), event reports and NRC Integrated Inspection Reports for the period of July 2016 through June 2017 to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that

the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's CR 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 MSPI emergency AC power system sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—High Pressure Injection Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—High Pressure Injection Systems PI for the period from the third quarter 2016 through the second quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, CRs, MSPI derivation reports, event reports and U.S. Nuclear Regulatory Commission (NRC) Integrated Inspection Reports for the period of July 2016 through June 2017 to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's CR 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 MSPI high pressure injection system sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index—Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI—Heat Removal System PI for the period from the third quarter 2016 through the second quarter 2017. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 31, 2013, were used. The inspectors reviewed the licensee's operator narrative logs, CRs, event reports, MSPI derivation reports, and NRC Integrated Inspection Reports for the period of July 2016 through June 2017 to validate the accuracy of the submittals. The inspectors reviewed the MSPI component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI

guidance. The inspectors also reviewed the licensee's CR 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 MSPI heat removal system sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.4 Radiological Effluent Technical Specification/Offsite Dose Calculation Manual  
Radiological Effluent Occurrences

a. Inspection Scope

The inspectors sampled licensee submittals for the radiological effluent TS/ODCM radiological effluent occurrences PI for the period from the second quarter of 2016 through the second quarter of 2017. The inspectors used PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 7, dated August 2013, to determine the accuracy of the PI data reported during those periods. The inspectors reviewed the licensee's CR database and selected individual reports generated since this indicator was last reviewed to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous effluent summary data and the results of associated offsite dose calculations for selected dates to determine if indicator results were accurately reported. The inspectors also reviewed the licensee's methods for quantifying gaseous and liquid effluents and determining effluent dose. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one radiological effluent TS/ODCM radiological effluent occurrences 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 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 corrective action program (CAP) at an appropriate threshold, adequate attention was being given to timely corrective actions, and adverse trends were identified and addressed. Some minor issues were entered into the licensee's CAP as a result of the inspectors' observations; however, they are not discussed in 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.

b. Findings

No findings were identified.

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

.1 'B' Standby Diesel Generator Cooling Water Leak

a. Inspection Scope

The inspectors observed the licensee's response to the cooling water leak from a flange connection on the number 11 cylinder. The licensee prepared a work order and tightened the flange connection to stop the leak. The licensee entered this into the CAP as CR 02224915.

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

b. Findings

No findings were identified.

.2 Human Performance Event; Partial Group 1 Isolation Signal from Low Condenser Vacuum During Calibration Activity; Unplanned Technical Specification Limiting Condition for Operation Entry

a. Inspection Scope

The inspectors reviewed the licensee's response to a human performance event that resulted in a partial Group 1 isolation signal and a partial turbine trip signal. While performing Surveillance Test Procedure (STP) 3.3.6.1-18, "Main Steam Line Isolation, Condenser Backpressure-High Channel Functional Test," a technician inadvertently grounded an instrument probe. This blew a fuse resulting in a partial Group 1 isolation signal and a partial turbine trip signal that alarmed in the control room. In addition, the blown fuse resulted in a loss of 1 of 2 required condenser backpressure-high instrument trip channels for the condenser backpressure main steam line isolation trip logic. The licensee entered TS 3.3.6.1 Condition A for the loss of the required instrumentation. The licensee performed a human performance investigation and entered this event into the CAP as CR 02223276.

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

b. Findings

No findings were identified.

.3 (Closed) Licensee Event Report 05000331/2016-003: Main Steam Isolation Valve Leakage Exceeded Technical Specification Limits

a. Inspection Scope

On October 8, 2016, 'B' inboard main steam line isolation valve (MSIV) failed local leak rate testing and on October 10, 2016, the inboard MSIV drain line outboard isolation valve failed local leak rate testing. This was entered into the licensee's CAP as CR 020161159, "CV4415 Failed Local Leakage Test," for the 'B' inboard MSIV and CR 02161307, "MO 4423 Failed LLRT," for the inboard MSIV drain line outboard isolation valve. The inspectors monitored licensee corrective actions after the TS violation was identified. The inspectors reviewed the licensee's response to the failed MSIV local leak rate tests performed during Refueling Outage (RFO) 25. The inspectors also reviewed Root Cause Report CR 02161689, "RFO 25 MSIV LLRT Failures."

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.

b. Findings

(1) Main Steam Isolation Valve Leakage Exceeded Technical Specification Limits

Description: On October 8, 2016 during RFO 25, local leak rate testing revealed that leakage past the 'B' inboard MSIV was 254 standard cubic feet per hour (scfh). This condition exceeded the TS 3.6.1.3 limit of less than or equal to 100 scfh through a single MSIV and the combined maximum main steam pathway limit of less than or equal to 200 scfh through all four main steam lines (including the inboard MSIV drain line). On October 10, 2016, local leak rate testing further determined that the leakage past the inboard MSIV drain line outboard isolation valve was 711 scfh. This was added to the combined maximum main steam pathway leakage rate.

Leak rate testing during previous refueling outages did not indicate an increasing trend in the leakage rate through the 'B' inboard MSIV or the inboard MSIV drain line outboard isolation valve. The 'B' inboard MSIV and the inboard MSIV drain line outboard isolation valve exhibited large step changes in leakage rate between RFO 24 and RFO 25 but had not exceeded Electric Power Research Institute rebuild frequency guidelines. However, the licensee concluded that the valve degradation was gradual and exceeded the Technical Specification limits sometime during the operating cycle.

The inspectors did not identify an associated performance deficiency for this TS violation. Specifically, the inspectors determined that this issue was not within the licensee's ability to foresee and correct. This determination was based on the fact that there was no firm evidence of a trend or other indication that the valves would exceed TS leakage rate limits when tested during RFO 24. Therefore, this violation was determined not to meet the requirements of a finding.

Corrective actions included reworking the inboard MSIV to restore the leakage rate below TS limits and plans to replace the inboard MSIV drain line outboard isolation valve with an optimal valve design. On October 30, 2016, the licensee transitioned the reactor

to Mode 2 for start-up with the inboard MSIV drain line inboard isolation valve disarmed in the closed position in compliance with TS 3.6.1.3.

Enforcement: Technical Specification 3.6.1.3 requires that the main steam pathway leakage be less than or equal to 100 scfh through a single MSIV and a combined maximum pathway limit through all four main steam lines (including the inboard MSIV drain line) be less than or equal to 200 scfh.

Contrary to the above, on October 8, 2016, during RFO 25, the licensee determined that the leakage rate through a single MSIV and the combined maximum pathway leakage rate for all four main steam lines exceeded the TS limits. Specifically, during local leakage rate testing, the licensee determined the 'B' inboard MSIV had a leakage rate of 254 scfh, which exceeded both limits. Additionally, on October 10, 2016, the licensee determined that the inboard MSIV drain line outboard isolation valve leakage rate was 711 scfh. This was added to the combined maximum pathway leakage rate for all four main steam lines.

The inspectors determined that no example from Section 6.1 of the Enforcement Policy adequately applied or described the situation. Therefore, Regional NRC management considered the risk significance of the underlying technical issue and, in consultation with the Office of Enforcement, determined the issue was best represented as a Severity Level IV violation. However, the NRC is exercising enforcement discretion for this violation in accordance with Section 3.10 of the Enforcement Policy. Enforcement Policy 3.10 states that the NRC may exercise discretion for violations of NRC requirements by reactor licensees for which there are no associated performance deficiencies.

This violation was entered into the licensee CAP as condition report (CR) 2161159, "CV4415 Failed Local Leakage Test," for the 'B' inboard MSIV and CR 2161307, "MO 4423 Failed LLRT," for the inboard MSIV drain line outboard isolation valve. Corrective actions included reworking the inboard MSIV to restore the leakage rate below TS limits and plans to replace the inboard MSIV drain line outboard isolation valve with an optimal valve design.

#### 4OA6 Management Meetings

##### .1 Exit Meeting Summary

On October 12, 2107, the inspectors presented the inspection results to Mr. D. Curtland, 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.

.2 Interim Exit Meetings

Interim exits were conducted for:

- The inspection results for the Radiation Safety Program review with Mr. D. Curtland, Director of Site Operations, on July 20, 2017.

The inspectors confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

D. Curtland, Site Vice President  
P. Hansen, Engineering Site Director  
M. Davis, Licensing Manager  
M. Fritz, Emergency Preparedness Manager  
J. Karrick, Nuclear Oversight Supervisor  
M. Strobe, Operations Director  
D. Morgan, Radiation Protection Manager  
M. Casey, Chemistry Manager  
J. Schwertfeger, Security Manager  
C. Hill, Training Manager  
D. Church, Engineering Programs Manager  
P. Polfleit, NextEra Energy EP Manager  
D. Bloomquist, Radiation Protection Supervisor  
E. Durbarow, Health Physicist  
D. Tanko, Senior Environmental Specialist

#### U.S. Nuclear Regulatory Commission

L. Kozak, Chief, Reactor Projects Branch 1

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

### Opened

None.

### Closed

|                   |     |   |
|-------------------|-----|---|
| 05000331/2016-003 | LER | Main Steam Isolation Valve Leakage Exceeded Technical Specification Limits (Section 4OA3) |
|-------------------|-----|---|

### 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.

### 1R04 Equipment Alignment

- Operating Instruction (OI) 150A2; RCIC System Valve Lineup; Revision 14
- OI 414A2; RBCCW System Valve Lineup; Revision 1
- OI 454A2; 'A' ESW System Valve Lineup; Revision 17
- Drawing BECH-M124; P. & I. D. Reactor Core Isolation Cooling System (Steam Side); Revision 64
- Drawing BECH-M125; P. & I. D. Reactor Core Isolation Cooling System (Water Side); Revision 36
- Drawing BECH-M112; P. & I. D. Reactor Building Cooling Water System; Revision 35
- Drawing BECH-M142; P. & I. D. Circulating Water System; Revision 102
- Drawing BECH-M132<2>; P. & I. D. 1G031 Standby Diesel Generator; Revision 16
- CR 02076763; PDI 4938A Indicates 37 Inches of Water

### 1R05 Fire Protection

- Fire Hazards Analysis-400; Fire Hazards Analysis; Revision 23
- Pre-Fire Plan (PFP)-TB-757; Pre-Fire Plan Turbine Building El. 757; Revision 3
- PFP-RR-001; Pre-Fire Plan Radioactive Release; Revision 0
- PFP-RB-716; Pre-Fire Plan Reactor Building El. 716; Revision 3
- PFP-CB-786; Pre-Fire Plan Control Building El. 786; Revision 1
- PFP-CB-800; Pre-Fire Plan Control Building El. 800; Revision 0
- PFP-PH-757; Pre-Fire Plan Pump House; Revision 1
- CR 02225515; Halon Fire Extinguisher Symbol Not Identified on PFP-CB-786
- FP-AB-100; DAEC Fire Protection Program

### 1R11 Licensed Operator Requalification Program

- Emergency Plan Implementing Procedure (EPIP) Form Emergency Action Level-01; Emergency Action Level Matrix - Hot Modes; Revision 10
- EPIP 1.1; Determination of Emergency Action Levels; Revision 29
- Abnormal Operating Procedure 255.2; Power/Reactivity Abnormal Changes; Revision 46
- Abnormal Operating Procedure 264; Loss of Recirculation Pump(s); Revision 14
- SEG 2017D-01E-A; 2017D Evaluated Scenario 'A'; Revision 0

### 1R12 Maintenance Effectiveness

- CR 02115340; 'D' River Water Supply Declining Flow Trend
- STP 3.0-01; Daily Instrument Check; Revision 161
- NS100102A; 'A' River Water Supply and Screen Wash System Vibration Measurement and Operability Test; Revision 22
- NS100102B; 'B' River Water Supply and Screen Wash System Vibration Measurement and Operability Test; Revision 24
- BECH M-146; P.& I.D. Service Water System Pump House; Revision 89

- Work Order (WO) 40478517 01; 1P209B-M, Change Oil & Inspect for Anomalies
- WO 40477285 01; 1P209B-M, Inspect & Perform Off-Line Motor Test
- CR 02225107; Seal Leaks on 1P209B CRD Pump
- CR 02225049; Potential trend for Indications on Control Rod Drive Pumps
- CR 02224315; Trend, 1P209A Oil Addition

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

- Work Planning Guideline-1; Work Process Guideline; Revision 65
- Work Planning Guideline-2; Online Risk Management Guideline; Revision 69
- Work Management-AA-100-1000; Work Activity Risk Management; Revision 10
- Work Management-AA-100-1000-F01; Work Activity Risk Management; Revision 2
- Operations (OP)-AA-104-1007; Online Aggregate Risk; Revision 4
- OP-AA-102-1003; Guarded Equipment; Revision 21
- Work Week 1728 Work Activity Risk Management (WARM) Summary and Weekly Probabilistic Risk Analysis (PRA); Revision 0
- WO 40507759; Support Diver Inspection and Clean, as Needed, 'A' RHRSW/ESW Pit
- WO 40495921; STP 3.1.7-01 Standby Liquid Control Pump Operability Test

### 1R15 Operability Evaluations

- EPIP Form Emergency Action Level-01; Emergency Action Level Matrix-Hot Modes; Revision 10
- Emergency Preparedness (EP)-AA-105; Maintaining Equipment Important to Emergency Response; Revision 5
- EP-AA-105 (DAEC); Maintaining Equipment Important to Emergency Preparedness (DAEC Specific Information); Revision 12
- EP-AA-105-1000; Equipment Important to Emergency Response; Revision 3
- BASES-EOP 3; EOP 3 – Secondary Containment Control Guideline; Revision 13
- Administrative Control Procedure 1410.1; Operations Working Standards; Revision 105
- CR 02214351; Received 1C04B(A-6) Reactor Building ARM HI RAD ALARM
- CR 02218174; MO2238 Valve Position Indication Lost Limiting Condition for Operation
- CR 02218077; Abnormal Position Indication HPCI Steam Supply Valve MO2238
- CR 02218077; Abnormal Position Indication HPCI Steam Supply Valve MO2238 Reportability Evaluation
- CR 02219155; As Found Conditions of RHRSW 1P22D Discharge Isolation Valve
- OP-AA-100-1000; Conduct of Operations ; Revision 22
- EP-AA-105-1000; Equipment Important to Emergency Response; Revision 3
- EP-AA-105 (DAEC); Maintaining Equipment Important to Emergency Preparedness (DAEC Specific Information); Revision 12
- CR 02221938; E41A-K059 Timer Not in Specification
- CR 02221958; 'A' RHRSW Discharge Valve Binding
- CR 02223589; EOP 3 Entry and Exit: RWCU Spent Resin Room Hi Rad Alarm
- CR 02223851; EOP 3 Entry and Exit on RI9173 RWCU Spent Resin RM ARM Alarm
- CR 02225524; Evaluate RI9173 ACMP for OPS Burden/Concern

### 1R18 Plant Modifications

- BECH 105 Sheet 8; 480V [Motor Control Center] MCC 1B14 Reactor Building 812.00 North; Revision 27
- BECH 105 Sheet 26; 480V [Motor Control Center] MCC 1B64 Reactor Building 812.00 North; Revision 27

- EC 288096; Removal of Floor Curb in Refuel Floor Wash Down Area
- EC 289386; Temporary Change in Support of Maintenance; Temporary Air Supply Jumper for V30-0317
- WO 403409987-03; Install Temporary Modification EC 289386

#### 1R19 Post Maintenance Testing

- NS13D002-A; Carbon Dioxide Cardox System Functional Test; Revision 27
- WO 40462399-01; Cardox System Operability Test
- WO 40559548-01; Repair Loose Wire Connection in 1K-4 Control Panel
- WO 40559835-01; 1G021/ENG: Torque Jacket Cooling Water CYL #11 Upper Flange
- STP 3.6.4.2-01A; Secondary Containment Isolation Damper Closing Time Test Channel A; Revision 10
- WO 40521056-01; Retention BLDG H&V EXHST to RX BLDG
- WO 40461557-09; 64D10: Install and Test seconds Ground Detection Monitor
- WO 40539915-01; GSW Pump 1P-89A Discharge Auto Vent
- WO 40559762-01; General Service Water Pump
- WO 40559861-02; OPS Perform PMT in accordance with OI-411; General Service Water System
- WO 40527034-01; CV8517 Cardox Selector Valve Pilot Possible Malfunction
- WO 40488101; CV8521 Cardox Leak from Cardox Selector Valve
- CR 02219744; CV 8521 Failed to Close During NS13D002A
- OI-411; General Service Water System; Revision 51

#### 1R22 Surveillance Testing

- STP NS 160004A; Surveillance Test Procedure 'A' RHR Service Water Operability Test and Comprehensive Pump Test; Revision 7
- STP 3.3.1.1-13; Turbine Control Valve EOC RPT and RPS Instrument Functional Test; Revision 15
- STP 3.3.1.1-19; Functional test of [Turbine Stop Valve] TSV Closure Input to RPS and RPT; Revision 21
- STP 3.7.7-01; Bypass Valve Test; Revision 18
- BECH-103 <1>; P.&I.D. Main Steam Turbine and Control Valves; Revision 44
- BECH-103 <1>; P.& I.D. Main Steam Moisture Separators & Re-Heaters<3>; Revision 18
- STP NS730105B; 'B' CAM/PASS System Leakage Inspection; Revision 7
- STP NS540002A; 'A' Emergency Service Water Operability Test; Revision 38
- CR 02225008; Section 7.4 of 'B' CAM/PASS Leakage Failed

#### 2RS5 Radiation Monitoring Instrumentation

- HPP 3110.72; Calibration of the Fastscan Whole Body Counter; Revision 5
- HPP 3110.72, Attachment 1; Reference Standard and Calibration Confirmation; May 10, 2017
- CR 02215977; Evaluate Pre-Inspection
- STP 3.3.3.1-03; Primary Containment Area Radiation Post Accident Monitoring Instrumentation Electronic Calibration; Revision 7
- STP 3.3.3.1-12; Primary Containment Area Radiation Post Accident Monitoring Drywell Instrumentation Source Calibration Check; Revision 1
- Calibration Results; AMP-100; Various Dates
- Calibration Results; AMS4; Various Dates
- Calibration Results; Ludlum 177; Various Dates
- Calibration Results; RO-2; Various Dates

- Calibration Results; Telepole; Various Dates
- Calibration Report; RTM 950; Various Dates
- Calibration Report; ARGOS 5AB; Various Dates
- Calibration Report; Cronos-1; Various Dates
- HPP 3110.39; Calibration and Response Check of the RADOS RTM 950 Portal Monitor; Revision 20
- HPP 3109.87; Operation of the ARGOS 5AB Personnel Contamination Monitor; Revision 3
- CR 02079473; Low Count Rate Identified on Head Detector Of PCM 1B; October 6, 2015
- CR 02102096; HP Instruments Overdue For Calibration & Repairs By [Maintenance & Testing Equipment] M&TE Tec; January 13, 2016

#### 2RS6 Radioactive Gaseous and Liquid Effluent Treatment

- Quick Hit #SA02209557; Assessment of Effluents Pre-NRC Inspection; June 9, 2017
- 2016 Annual Radioactive Material Release Report; April 28, 2017
- Duane Arnold Energy Center Offsite Dose Assessment Manual; Revision 37
- STP NS790707; Radioactive Liquid Release Sampling & Analysis; Revision 3
- STP NS790709; [Ground Water Protection Program] GWPP Mitigation System; Revision 1
- STP NS790302; Liquid Process Rad Monitor INOP Sampling and Analysis; Revision 21
- STP NS790702; Continuous Service Water Release Sampling & Analysis; Revision 26
- STP NS790701; Continuous Service Water Tritium Sampling & Analysis; Revision 4
- STP NS791001; K12 Functional Test; Revision 10
- STP NS790601; Effluent P&I Sampling & Analysis; Revision 31
- Work Order Package 40388104 01; STP NS7901013 K10 Calibration; March 2, 2016
- Work Order Package 40484268 01; STP NS791012 K10 Functional; June 29, 2017
- Work Order Package 40472205 01; STP NS790101 Extended Range Eff Rad Mon Cal Offgas; February 6, 2017
- Work Order Package 40388754 01; STP NS791007 K4 Calibration; March 11, 2016
- Work Order Package 40482898 01; STP NS791006 K4 Functional; June 9, 2017
- Work Order Package 40492883 01; STP NS790502 Ext Range Eff Rad Mon Cal 'A' Rx Bldg; May 11, 2017
- Work Order Package 40477912 01; STP NS790304 RHRSW Radiation Monitor Functional; May 17, 2017
- Work Order Package 40461991 01; STP NS790305 RHRSW Radiation Monitor Calibration; February 28, 2017
- Work Order Package 40479070 01; STP 3.6.4.3-03-A SBGT Sys HEPA/Char Filter Efficiency; May 29, 2017
- EC-287061; Ground Water Mitigation Phase 3 Permanent Power and Monitoring; Revision 3
- Results of Radiochemistry Cross Check Program; Eckert & Ziegler Analytics; Multiple Dates
- CR 02216190; Enhancement to Chemistry's Inter-Laboratory Sample Program; July 20, 2017
- CR 02215943; ODAM Revision 37, Needs to be updated for Post-GWPP Liquid Effluent Releases; July 19, 2017

#### 4OA1 Performance Indicator Verification

- STP NS790708; Offsite Effluent Dose Calculation; Revision 6
- NRC PI Data Calculation; RETS/ODCM Radiological Effluent; Various Dates
- DAEC MSPI Basis Document; Revision 17
- EN-AA-105-1005; Mitigating System Performance Indicator; Revision 2
- Administrative Control Procedure 1402.4; NRC, WANO & MOPR Performance Indicator Reporting; Revision 22

- NRC PI Data Calculation, Review and Approval; MSPI AC Power System; Third Quarter 2015 through Second Quarter 2016
- NRC PI Data Calculation, Review and Approval; MSPI AC Power System; Third Quarter 2015 through Second Quarter 2016
- NRC PI Data Calculation, Review and Approval; MSPI Heat Removal System; Third Quarter 2015 through Second Quarter 2016
- NRC PI Data Calculation, Review and Approval; MSPI High Pressure Injection System; Third Quarter 2015 through Second Quarter 2016

#### 4OA3 Follow-Up of Events and Notices

- CR 02224916; 'B' SBDG Jacket Cooling Water Leak Identified
- STP 3.3.6.1-18; Main Steam Line Isolation, Condenser Backpressure-High Channel Functional Test
- CR 2223276; Fuse Blown when Disconnection Meter During STP
- Root Cause Report CR 02161689; RFO 25 MSIV LLRT Failures

## LIST OF ACRONYMS USED

|       |  |
|-------|--|
| CAP   | Corrective Action Program                |
| CFR   | <i>Code of Federal Regulations</i>       |
| CR    | Condition Report                         |
| DAEC  | Duane Arnold Energy Center               |
| EDG   | Emergency Diesel Generator               |
| EOP   | Emergency Operating Procedure            |
| EPIP  | Emergency Plan Implementing Procedure    |
| ESW   | Emergency Service Water                  |
| HPCI  | High Pressure Coolant Injection          |
| IP    | Inspection Procedure                     |
| MSIV  | Main Steam Isolation Valve               |
| MSPI  | Mitigating Systems Performance Indicator |
| NEI   | Nuclear Energy Institute                 |
| NRC   | U.S. Nuclear Regulatory Commission       |
| ODCM  | Offsite Dose Calculation Manual          |
| OI    | Operating Instruction                    |
| PFP   | Pre-Fire Plan                            |
| PI    | Performance Indicator                    |
| RFO   | Refueling Outage                         |
| RHRSW | Residual Heat Removal Service Water      |
| STP   | Surveillance Test Procedure              |
| TS    | Technical Specification                  |
| UFSAR | Updated Final Safety Analysis Report     |
| WO    | Work Order                               |