



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION III
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LISLE, IL 60532-4352

February 1, 2017

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 05000331/2016004; 05000331/2016501

Dear Mr. Curtland:

On December 31, 2016, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Duane Arnold Energy Center. On January 5, 2017, and again on January 19, 2017, the NRC inspectors discussed the results of this inspection with Mr. Thomas Vehec and other members of your staff. Inspectors documented the results of this inspection in the enclosed inspection report. The NRC also completed its annual inspection of the Emergency Preparedness Program. This inspection began on January 1, 2016, and issuance of this letter closes Inspection Report Number 2016501.

Based on the results of this inspection, the NRC has identified two issues that were evaluated under the risk significance determination process as having very low safety significance (Green). One of which was evaluated as an NRC-identified issue under the traditional enforcement process as having very low safety significance (Severity Level IV). The NRC determined there were two violations associated with the issues. Further, the inspectors documented four licensee-identified violations which were determined to be of very low safety significance in this report. One of which was evaluated under the traditional enforcement process as having very low safety significance (Severity Level IV). Because the licensee initiated condition reports to address these issues, these violations are being treated as Non-Cited Violations (NCVs), consistent with Section 2.3.2a of the Enforcement Policy.

If you contest the violations or significance of these NCVs, 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.

D. Curtland

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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.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure(s), and your response, (if any), will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. To the extent possible, your response should not include any personal privacy or proprietary, information so that it can be made available to the Public without redaction.

Sincerely,

/RA/

Karla Stoedter, Chief
Branch 1
Division of Reactor Projects

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

Enclosure:
IR 05000331/2016004; 05000331/2016501

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000331/2016004; 05000331/2016501

Licensee: NextEra Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: Palo, IA

Dates: October 1 through December 31, 2016

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Division of Reactor Projects

Enclosure

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SUMMARY

Inspection Report 05000331/2016004; 05000331/2016501, 10/01/2016–12/31/2016; Duane Arnold Energy Center; Operability Determinations and Functionality Assessment, Drill Evaluation, Maintenance Risk Assessment, and Refueling Activities.

This report covers a 3-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. Two Green findings were identified by the inspectors. These findings involved Non-Cited Violations (NCVs) 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 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," dated July 2016.

Cornerstone: Mitigating Systems

Severity Level IV. The inspectors identified a finding of very low safety significance (Green) and an associated Severity Level IV NCV of Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50.59, "Changes, Tests, and Experiments," when licensee personnel failed to perform an adequate written evaluation to demonstrate that a procedure change did not require a license amendment. Specifically, the licensee implemented a change to annunciator response procedure (ARP) 1C03B, "Reactor and Containment Cooling and Isolation," that revised low pressure coolant injection (LPCI) system operability determination information which impacted the safety-related function of the LPCI system. The licensee entered the inspectors' concerns into their corrective action program as condition report (CR) 02158897. Corrective actions included providing operating crew orders to preclude challenging the low pressure coolant injection system's function, performing a condition evaluation and revising the ARP.

The inspectors determined the failure to provide an adequate evaluation that documented the basis for determining the change to ARP 1C03B did not require a license amendment was a performance deficiency. The performance deficiency was determined to be more than minor because it impacted the Mitigating System cornerstone attribute of procedure quality and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was screened against the Mitigating Systems cornerstone and determined to be of very low safety significance because all of the associated questions in IMC 0609, Appendix A, were answered no. Violations of 10 CFR 50.59 are dispositioned using the traditional enforcement process because they are considered to be violations that potentially impede or impact the regulatory process. The inspectors reviewed Section 6.1.d.2 of the NRC Enforcement Policy and determined this violation was Severity Level IV because the resulting changes were evaluated by the Significance Determination Process (SDP) as having very low safety significance. The inspectors determined this finding affected the cross-cutting area of human performance, in the aspect of design margin, where margins are carefully guarded and changed only through

a systematic and rigorous process. Specifically, the licensee made a decision to proceed with revising the annunciator response procedure using the results of a condition evaluation (a non-design basis document) in lieu of following their systematic and rigorous process for evaluating changes to the Updated Final Safety Analysis Report (UFSAR) [H.6]. (Section 4OA2)

Cornerstone: Emergency Preparedness

Green. The inspectors identified a finding of very low safety significance and an NCV of 10 CFR 50.54(q)(2) associated with the failure to maintain the effectiveness of an emergency plan that meets the requirements in 10 CFR 50, Appendix E. Specifically, the licensee failed to control an emergency preparedness table-top drill scenario, per procedure EP-AA-101-1000, to avoid preconditioning Emergency Response Organization (ERO) drill participants. The licensee entered this issue into their Corrective Action Program as CR 02172325. Corrective actions included removing the Drill/Exercise Performance Indicator credit for the drill conducted on November 30, 2016 and from any preconditioned individuals. The licensee also planned to remove the drill scenario from Emergency Planning Department Manual (EPDM) 1024.

The inspectors determined that the licensee's failure to control an emergency preparedness table-top drill scenario in accordance with EP-AA-101-1000 to avoid preconditioning ERO drill participants was more than minor because it was associated with the ERO performance attribute of the Emergency Preparedness cornerstone and adversely affected the cornerstone objective of ensuring that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. The finding was determined to be of very low safety significance because the finding was a failure to comply with the requirements in planning standard 10 CFR 50.47(b)(14) but did not involve a loss of planning standard function. The inspectors determined this finding affected the cross-cutting area of human performance, in the aspect of avoid complacency, where individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reductions tools. Specifically, the licensee failed to implement error reduction tools by reviewing the table-top procedure before conducting the drill and failed to plan for the inherent risk of players seeing the same scenario multiple times when the scenario is repeated [H.12]. (Section 1EP6)

Licensee-Identified Violations

Violations of very-low safety significance or Severity Level IV that were identified by the licensee have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's Corrective Action Program. These violations and corrective action tracking numbers are listed in Section 4OA7 of this report.

REPORT DETAILS

Summary of Plant Status

Duane Arnold Energy Center (DAEC) was operating at 92 percent reactor power in coastdown at the beginning of the inspection period. The licensee shut the reactor down to begin refueling outage (RFO) 25 on October 3, 2016. On October 30, 2016, DAEC commenced a reactor startup. The licensee synchronized DAEC to the grid on November 1, 2016, and incrementally increased power to achieve 100 percent reactor power on November 11, 2016. On December 3, 2016, the licensee reduced reactor power to 90 percent to withdraw the central control rod and returned to 100 percent reactor power on December 4, 2016. With the exception of minor power adjustments for control rod sequence exchange, DAEC remained at 100 percent reactor power for the remainder of the inspection period.

1. REACTOR SAFETY

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

1R01 Adverse Weather Protection (71111.01)

.1 Winter Seasonal Readiness Preparations

a. Inspection Scope

The inspectors conducted a review of the licensee's preparations for winter conditions to verify that the plant's design features and implementation of procedures were sufficient to protect mitigating systems from the effects of adverse weather. Documentation for selected risk-significant systems was reviewed to ensure that these systems would remain functional when challenged by inclement weather. During the inspection, the inspectors focused on plant specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the UFSAR and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant specific procedures. Cold weather protection, such as heat tracing and area heaters, was verified to be in operation where applicable. The inspectors also reviewed 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. Documents reviewed are listed in the Attachment to this report. The inspectors' reviews focused specifically on the following plant systems due to their risk significance or susceptibility to cold weather issues:

- ground water tritium mitigation;
- plant air intake damper;
- portable diesel fire pump; and
- technical support center diesel generator.

This inspection constituted one winter seasonal readiness preparations sample as defined in Inspection Procedure (IP) 71111.01.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Semi-Annual Complete System Walkdown

a. Inspection Scope

Between November 15 and November 18, 2016, the inspectors performed a complete system alignment inspection of the residual heat removal service water system to verify the functional capability of the system. This system was selected because it was considered both safety significant and risk significant in the licensee's probabilistic risk assessment. The inspectors walked down the system to review mechanical and electrical equipment lineups; electrical power availability; system pressure and temperature indications, as appropriate; component labeling; component lubrication; component and equipment cooling; hangers and supports; operability of support systems; and to ensure that ancillary equipment or debris did not interfere with equipment operation. A review of a sample of past and outstanding work orders (WOs) was performed to determine whether any deficiencies significantly affected the system function. In addition, the inspectors reviewed the CAP database to ensure that system equipment alignment problems were being identified and appropriately resolved. Documents reviewed are listed in the Attachment to this report.

These activities constituted one system walkdown sample as defined in IP 71111.04.

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 (Zones 2-C, 2-E, 2-F, 2-G, and DRY [drywell]) and radioactive release (Zones 2-F and 2-K);
- turbine building elevation 780 and radioactive release (zones 9-A, 9-B, and 9-C);
- control building elevation 772;
- low level rad processing and storage facility (Zones 21-F, 21-G, 21-H, 21-I, 21-J, 21-K, 21-L, 21-M, 21-O and 21-S) and radioactive release (Zones 21-G, 21-M and 21-S); and
- intake structure (all 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 activities constituted five quarterly fire protection samples as defined in IP 71111.05.

b. Findings

No findings were identified.

1R08 Inservice Inspection Activities (71111.08)

From October 5, 2016, through October 12, 2016, the inspectors conducted a review of the implementation of the licensee's Inservice Inspection (ISI) Program for monitoring degradation of the reactor coolant system, risk significant piping and components and containment systems.

The inspections described in Sections 1R08.1 and 1R08.2 below constituted one inspection sample as defined in IP 71111.08.

.1 Piping Systems Inservice Inspection

a. Inspection Scope

The inspectors observed the following non-destructive examinations (NDE) mandated by the American Society of Mechanical Engineers (ASME) Section XI Code to evaluate compliance with the ASME Code Section XI and Section V requirements and if any indications and defects were detected, to determine if these were dispositioned in accordance with the ASME Code or an NRC approved alternative requirement:

- phased array ultrasonic testing of code class 1 standby liquid control (SBLC) nozzle to safe end weld LCA-F002 (WO 40433432); and
- visual examination of drywell penetrations (WO 40389199).

The inspectors observed the following NDE conducted as part of the licensee's license renewal program commitments to determine if the examination was conducted in accordance with the licensee's augmented inspection program, industry guidance

documents and associated licensee examination procedures. If any indications and defects were detected, the inspectors conducted further inspections to determine if the defects were dispositioned in accordance with approved procedures and NRC requirements:

- phased array ultrasonic testing of code class 1 SBLC socket welds LCA–J023 and LCA–J024 (WO 40433431).

During the prior outage non-destructive surface and volumetric examinations, the licensee did not identify any relevant/recordable indications. Therefore, no NRC review was completed for this inspection procedure attribute.

The inspectors observed the following pressure boundary welds completed for risk-significant systems during the outage to determine if the licensee applied the pre-service NDE and acceptance criteria required by the construction code. Additionally, the inspectors reviewed the welding procedure specifications and supporting weld procedure qualification records to determine if the weld procedures were qualified in accordance with the requirements of construction code and ASME Code Section IX:

- code class 2, hardened vent pipe installation (WO 40387394);
- code class 2, residual heat removal valve MO2009 replacement (WO 40201185); and
- code class 2, 4” residual heat removal pipe connection (WO 40376987).

b. Findings

No findings were identified.

.2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors performed a review of ISI-related problems entered into the licensee’s CAP and conducted interviews with licensee staff to determine if the licensee had:

- established an appropriate threshold for identifying ISI-related problems;
- performed a root cause (if applicable) and taken appropriate corrective actions; and
- evaluated operating experience and industry generic issues related to ISI and pressure boundary integrity.

The inspectors performed these reviews to evaluate compliance with Title 10 of the *Code of Federal Regulations* (10 CFR), Part 50, Appendix B, Criterion XVI, “Corrective Action,” requirements. The corrective action documents reviewed by the inspectors are listed in the Attachment to this report.

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 December 14, 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 Technical Specification (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.

b. Findings

No findings were identified.

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

a. Inspection Scope

On October 3, 2016, the inspectors observed licensed operators perform a reactor shutdown in the control room. 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 (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.

b. Findings

No findings were identified.

.3 Resident Inspector Quarterly Observation during Periods of Heightened Activity or Risk (71111.11Q)

a. Inspection Scope

On October 30, 2016, the inspectors observed licensed operators perform a reactor startup in the control room. 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 (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.

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:

- residual heat removal service water flow control valves repair; and

- 'B' recirculation pump seal refurbishment and change out during the refueling outage.

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 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 performed a quality control review for 'B' recirculation pump seal repair, as discussed in IP 71111.12, Section 02.02.

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 one quarterly maintenance effectiveness sample and one quality control sample as defined in IP 71111.12.

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:

- shutdown time to boil calculation; and
- switchyard maintenance.

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.

b. Findings

On October 15, 2016, the licensee identified a missed required evaluation for a potential shutdown risk change from yellow to orange when the time to boil was incorrectly calculated to be greater than 24 hours. The enforcement aspects of this issue are discussed in Section 4OA7 of this report.

1R15 Operability Determinations and Functional Assessments (71111.15)

.1 Operability Evaluations

a. Inspection Scope

The inspectors reviewed the following issues:

- torus coating indications;
- fuel move prerequisites; and
- main steam line outboard drain failed local leak rate test.

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 three samples as defined in IP 71111.15.

b. Findings

During the performance of refueling operations on October 7, 2016, the licensee identified that fuel moves had commenced without meeting all procedurally required fuel move prerequisites of RFO 403, "Performance of Fuel Handling Activities." The enforcement aspects of this issue are discussed in Section 4OA7 of this report.

.2 Annual Sample: Review of Operator Workarounds

a. Inspection Scope

The inspectors evaluated the licensee's implementation of their process used to identify, document, track, and resolve operational challenges. Inspection activities included, but were not limited to, a review of the cumulative effects of operator workarounds (OWAs) on system availability and the potential for improper operation of the system, for potential impacts on multiple systems, and on the ability of operators to respond to plant transients or accidents.

The inspectors performed a review of the cumulative effects of OWAs. The documents listed in the Attachment to this report were reviewed to accomplish the objectives of the inspection procedure. The inspectors reviewed both current and historical operational challenge records to determine whether the licensee was identifying operator challenges at an appropriate threshold, had entered them into their CAP and proposed or implemented appropriate and timely corrective actions which addressed each issue. Reviews were conducted to determine if any operator challenge could increase the possibility of an Initiating Event, if the challenge was contrary to training, required a change from long-standing operational practices, or created the potential for inappropriate compensatory actions. Additionally, all temporary modifications were reviewed to identify any potential effect on the functionality of Mitigating Systems, impaired access to equipment, or required equipment uses for which the equipment was not designed. Daily plant and equipment status logs, degraded instrument logs, and operator aids or tools being used to compensate for material deficiencies were also assessed to identify any potential sources of unidentified OWAs.

This review constituted one operator workaround annual inspection sample as defined in IP 71111.15.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

The inspectors reviewed the following modifications:

- well water temporary modification for shut down cooling out of service;
- hardened containment vent system modification; and
- diverse and flexible mitigation capability (FLEX) system.

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 three plant modification samples as defined in IP 71111.18.

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:

- low pressure coolant injection swing bus undervoltage relay replacement;
- 'A' standby diesel generator fast start operability test;
- river water supply radwaste dilution line isolation actuator replacement;
- main steam drain line valve repair;
- dry well purge line isolation valve;
- initiation and explosive valve test for the SBLC system;
- 'A' control building chiller temperature control valve TCV [Temperature Control Valve] –6935A replacement; and
- 'A' residual heat removal system logic system functional test.

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 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 eight post-maintenance testing samples as defined in IP 71111.19.

b. Findings

No findings were identified.

1R20 Outage Activities (71111.20)

.1 Refueling Outage Activities

a. Inspection Scope

The inspectors reviewed the Outage Safety Plan (OSP) and contingency plans for the Unit refueling outage, conducted October 3, 2016, to confirm that the licensee had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense-in-depth. During the RFO, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below:

- licensee configuration management, including maintenance of defense-in-depth commensurate with the OSP for key safety functions and compliance with the applicable TS when taking equipment out of service;
- implementation of clearance activities and confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing;
- installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error;
- controls over the status and configuration of electrical systems to ensure that TS and OSP requirements were met, and controls over switchyard activities;
- monitoring of decay heat removal processes, systems, and components;
- controls to ensure that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system;
- reactor water inventory controls including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss;
- controls over activities that could affect reactivity;
- maintenance of secondary containment as required by TS;
- licensee fatigue management, as required by 10 CFR 26, Subpart I;
- refueling activities, including fuel handling and sipping to detect fuel assembly leakage;
- startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the drywell (primary containment) to verify that debris had not been left which could block emergency core cooling system suction strainers, and reactor physics testing; and
- licensee identification and resolution of problems related to RFO activities.

Documents reviewed are listed in the Attachment to this report.

This inspection constituted one RFO sample as defined in IP 71111.20.

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:

- turbine overspeed testing (routine);
- core spray check valve operability test surveillance test procedure (STP) NS510001 (routine);
- main steam isolation valve local leak rate testing (Containment Isolation Valve);
- in-service check valve air test of SBLC injection STP NS590011 (In-service Test); and
- 'A' train loss of offsite power – loss of coolant accident STP (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, ASME 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 three routine surveillance testing samples, one in-service test sample and one containment isolation valve sample as defined in IP 71111.22.

b. Findings

No findings were identified.

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The regional inspectors performed an in-office review of the latest revisions to the Emergency Plan and Emergency Action Levels (EALs).

The licensee transmitted the Emergency Plan and EAL revisions to the NRC pursuant to the requirements of 10 CFR 50 Appendix E, Section V, "Implementing Procedures." The NRC review was not documented in a Safety Evaluation Report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection.

This EAL and Emergency Plan Changes inspection constituted one sample as defined in IP 71114.

b. Findings

No findings were identified.

1EP6 Drill Evaluation (71114.06)

.1 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on December 7, 2016, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the Technical Support Center (TSC) to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment to this report.

This emergency preparedness drill inspection constituted one sample as defined in IP 71114.06.

b. Findings

No findings were identified.

.2 Emergency Preparedness Drill Observation

a. Inspection Scope

The inspectors evaluated the conduct of a routine licensee emergency drill on November 30, 2016, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the TSC to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee drill critique to compare any inspector-observed weakness with those identified by the licensee staff in order to evaluate the critique and to verify whether the licensee staff was properly identifying weaknesses and entering them into the corrective action program. As part of the inspection, the inspectors reviewed the drill package and other documents listed in the Attachment to this report.

This emergency preparedness drill inspection constituted one sample as defined in IP 71114.06.

b. Findings

(1) Failure to Control Emergency Preparedness Drill Scenario

Introduction: The inspectors identified a finding of very low safety significance (Green) and an NCV of 10 CFR 50.54(q)(2) associated with the failure to maintain the effectiveness of an emergency plan that meets the requirements in 10 CFR 50, Appendix E. Specifically, the licensee failed to control an emergency preparedness table-top drill scenario, per EP-AA-101-1000, to avoid preconditioning Emergency Response Organization (ERO) drill participants.

Description: On November 30, 2016, the inspectors observed the performance of an emergency preparedness table-top exercise credited for Drill/Exercise Performance Indicator (DEP/PI) opportunities and the associated critique. The inspectors reviewed procedure EPDM 1024, "Table-top Drills," Revision 2, and identified the procedure included a scenario example that was the same as the scenario used in the table-top exercise.

The inspectors asked the licensee if the scenario was used for other drills during the last three years and were informed by the licensee that the scenario had been used three times during the last three years: May 11, 2016, August 24, 2016, and November 30, 2016. The licensee also discovered that eight ERO players had observed or participated in the table-top drill scenario twice between May and November 2016. The licensee further stated that none of the individuals had used the table-top drills for qualification.

Title 10 of the CFR, Section 50.47, "Emergency Plans," planning standard (b)(14) requires licensees to conduct periodic drills to develop and maintain key skills. Part 50, Appendix E, "Emergency Planning and Preparedness for Production and Utilization Facilities," further requires the licensee to use drill scenarios that provide reasonable assurance that anticipatory responses will not result from preconditioning of participants.

Section 4.7 of procedure EP-AA-101-1000, "Nuclear Division Drill and Exercise Procedure," Revision 16, implements the above requirements, stating, in part, "a complete drill scenario may be repeated in the next drill provided that confidentiality is maintained to ensure the drill is a performance enhancing experience (e.g., using different responders, controllers from previous drill are not responders in current drill, etc.)." Additionally, Section 4.9 states, in part, "scenario information is identified as confidential and shared only with individuals who require it for work responsibilities." The licensee failed to maintain control over the scenario per EP-AA-101-1000 and thus allowed participants to be preconditioned.

The licensee generated condition report (CR) 02172325, "NRC Questions about Recent ERO Tabletop Drill at TSC," removed the DEP/PI credit for the drill conducted on November 30, 2016, and from any preconditioned individuals, and the licensee has an action to remove the scenario from EPDM 1024.

Analysis: The inspectors determined that the licensee's failure to control an emergency preparedness table-top drill scenario in accordance with EP-AA-101-1000 to avoid preconditioning ERO drill participants was a performance deficiency. The performance deficiency was determined to be more than minor, in accordance with Inspection Manual Chapter (IMC) 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Screening," dated September 7, 2012, because it was associated with the ERO performance attribute of the Emergency Preparedness cornerstone and adversely affected the cornerstone objective of ensuring that the licensee is capable of implementing adequate measures to protect the health and safety of the public in the event of a radiological emergency. Using IMC 0609, Attachment 4, "Initial Characterization of Findings," dated October 7, 2016, and Appendix B, "Emergency Preparedness Significance Determination Process," dated September 22, 2015, the finding was determined to be of very low safety significance (Green) because the finding was a failure to comply with the requirements in planning standard 10 CFR 50.47(b)(14) but did not involve a loss of planning standard function.

The inspectors determined this finding affected the cross-cutting area of human performance, in the aspect of avoid complacency, where individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reductions tools. Specifically, the licensee failed to implement error reduction tools by reviewing the table-top procedure before conducting the drill and failed to plan for the inherent risk of players seeing the same scenario multiple times when the scenario is repeated [H.12].

Enforcement: Title 10 of the CFR, Section 50.54(q)(2) requires, in part, that a holder of a license under this part shall follow and maintain the effectiveness of an emergency plan that meets the requirements of Appendix E to this part, and for nuclear power reactors licensees, the planning standards of 10 CFR 50.47(b).

Title 10 of the CFR, Part 50, Appendix E, Section IV(F)(2)(i) states, in part, that licensees shall use drill and exercise scenarios that provide reasonable assurance that anticipatory responses will not result from preconditioning of participants.

Contrary to the above, on May 11, August 24, and November 30, 2016, the licensee failed to maintain the effectiveness of an emergency plan that meets the requirements of Appendix E in that the licensee failed to use drill and exercise scenarios that provided reasonable assurance that anticipatory responses will not result from preconditioning of participants. Specifically, the licensee failed to maintain control of the scenario in accordance with EP-AA-101-1000, resulting in preconditioning the ERO drill participants. As corrective actions, the licensee is not taking DEP/PI credit for the November 30, 2016, drill and from any preconditioned individuals, and is removing the example scenario from EPDM 1024. Because the violation was of very low safety significance and was entered into the licensee's corrective action program as CR 02172325, this violation is being treated as a NCV, consistent with Section 2.3.2 of the Enforcement Policy. **(NCV 05000331/2016004-01: Failure to Control Emergency Preparedness Drill Scenario)**

2. RADIATION SAFETY

Cornerstone: Public Radiation Safety

2RS1 Radiological Hazard Assessment and Exposure Controls (71124.01)

.1 Radiological Hazard Assessment (02.02)

a. Inspection Scope

The inspectors assessed the licensee's current and historic isotopic mix, including alpha emitters and other hard-to-detect radionuclides. The inspectors evaluated whether survey protocols were reasonable to identify the magnitude and extent of the radiological hazards.

The inspectors determined if there had been changes to plant operations since the last inspection that may have resulted in a significant new radiological hazard for onsite individuals. The inspectors evaluated whether the licensee assessed the potential impact of these changes and implemented periodic monitoring, as appropriate, to detect and quantify the radiological hazard. The inspectors reviewed the last two radiological surveys from selected plant areas and evaluated whether the thoroughness and frequency of the surveys were appropriate for the given radiological hazard.

The inspectors conducted walkdowns of the facility, including radioactive waste processing, storage, and handling areas to evaluate material conditions and performed independent radiation measurements as needed to verify conditions were consistent with documented radiation surveys.

The inspectors assessed the adequacy of pre-work surveys for select radiologically risk-significant work activities.

The inspectors evaluated the Radiological Survey Program to determine if hazards were properly identified. The inspectors discussed procedures, equipment, and performance of surveys with radiation protection staff and assessed whether technicians were knowledgeable about when and how to survey areas for various types of radiological hazards.

The inspectors observed work in potential airborne areas to assess whether air samples were being taken appropriately for their intended purpose and reviewed various survey records to assess whether the samples were collected and analyzed appropriately. The inspectors also reviewed the licensee's program for monitoring contamination which has the potential to become airborne.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.2 Instructions to Workers (02.03)

a. Inspection Scope

The inspectors reviewed select radiation work permits (RWPs) used to access high radiation areas and evaluated the specified work control instructions or control barriers. The inspectors also assessed whether workers were made aware of the work instructions and area dose rates.

The inspectors reviewed electronic alarming dosimeter dose and dose rate alarm setpoint methodology. For selected electronic alarming dosimeter occurrences, the inspectors assessed the worker's response to the alarm, the licensee's evaluation of the alarm, and any follow-up investigations.

The inspectors reviewed the licensee's methods for informing workers of changes in plant operations or radiological conditions that could significantly impact their occupational dose.

The inspectors reviewed the labeling of select containers of licensed radioactive material that could cause unplanned or inadvertent exposure to workers.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.3 Contamination and Radioactive Material Control (02.04)

a. Inspection Scope

The inspectors observed locations where the licensee monitors material leaving the radiologically controlled area and assessed the methods used for control, survey, and release of material from these areas. As available, the inspectors observed health physics personnel surveying and releasing material for unrestricted use.

The inspectors observed workers leaving the radiologically controlled area and assessed their use of tool and personal contamination monitors and reviewed the licensee's criteria for use of the monitors.

The inspectors assessed whether instrumentation was used at its typical sensitivity levels based on appropriate counting parameters or whether the licensee had established a de facto release limit.

The inspectors selected several sealed sources from the licensee's inventory records and assessed whether the sources were accounted for and verified to be intact. The inspectors also evaluated whether any transactions, since the last inspection, involving nationally tracked sources were reported in accordance with 10 CFR 20.2207.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

On October 5, 2016, during routine source inventory and inspection the licensee discovered that it had failed to reconcile the inventory of its nationally tracked source against the licensee's data in the National Source Tracking System (NSTS) during the month of January in 2010 through 2016. The enforcement aspects of this issue are discussed in Section 4OA7 of this report.

.4 Radiological Hazards Control and Work Coverage (02.05)

a. Inspection Scope

The inspectors evaluated ambient radiological conditions during tours of the facility. The inspectors assessed whether the conditions were consistent with applicable posted surveys, RWPs, and worker briefings.

The inspectors evaluated the adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination controls. The inspectors evaluated the licensee's use of electronic alarming dosimeters in high noise areas as high radiation area monitoring devices.

The inspectors assessed whether radiation monitoring devices were placed on the individual's body consistent with licensee procedures. The inspectors assessed whether the dosimeter was placed in the location of highest expected dose or that the licensee properly employed an NRC approved method of determining effective dose equivalent.

The inspectors reviewed the application of dosimetry to effectively monitor exposure to personnel in work areas with significant dose rate gradients.

For select airborne area RWPs, the inspectors reviewed airborne radioactivity controls and monitoring, the potential for significant airborne levels, containment barrier integrity, and temporary filtered ventilation system operation.

The inspectors examined the licensee's physical and programmatic controls for highly activated or contaminated materials stored within pools and assessed whether appropriate controls were in place to preclude inadvertent removal of these materials from the pool.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.5 High Radiation Area and Very High Radiation Area Controls (02.06)

a. Inspection Scope

The inspectors observed posting and physical controls for high radiation areas and very high radiation areas to assess adequacy.

The inspectors conducted a selective inspection of posting and physical controls for high radiation areas and very high radiation areas to assess conformance with performance indicators.

The inspectors reviewed procedural changes to assess the adequacy of access controls for high and very high radiation areas to determine whether procedural changes substantially reduced the effectiveness and level of worker protection.

The inspectors assessed the controls of the high radiation areas greater than 1 rem/hour and areas with the potential to become high radiation areas greater than 1 rem/hour for compliance with TS and procedures.

The inspectors assessed the controls for very high radiation areas and areas with the potential to become very high radiation areas. The inspectors also assessed whether individuals were unable to gain unauthorized access to these areas.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.6 Radiation Worker Performance and Radiation Protection Technician Proficiency (02.07)

a. Inspection Scope

The inspectors observed radiation worker performance and assessed their performance with respect to radiation protection work requirements, the level of radiological hazards present, and RWP controls.

The inspectors assessed worker awareness of electronic alarming dosimeter set points, stay times, or permissible dose for radiologically significant work as well as expected response to alarms.

The inspectors observed radiation protection technician performance and assessed whether the technicians were aware of the radiological conditions and RWP controls and whether their performance was consistent with training and qualifications for the given radiological hazards.

The inspectors observed radiation protection technician performance of radiation surveys and assessed the appropriateness of the instruments being used, including calibration and source checks.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

No findings were identified.

.7 Problem Identification and Resolution (02.08)

a. Inspection Scope

The inspectors assessed whether problems associated with radiological hazard assessment and exposure controls were being identified at an appropriate threshold and were properly addressed for resolution. For select problems, the inspectors assessed the appropriateness of the corrective actions. The inspectors also assessed the licensee's program for reviewing and incorporating operating experience.

The inspectors reviewed select problems related to human performance errors and assessed whether there was a similar cause and whether corrective actions taken resolve the problems.

The inspectors reviewed select problems related to radiation protection technician error and assessed whether there was a similar cause and whether corrective actions taken resolve the problems.

These inspection activities constituted one sample as defined in IP 71124.01.

b. Findings

No findings were identified.

2RS2 Occupational As-Low-As-Reasonably-Achievable Planning and Controls (71124.02)

.1 Radiological Work Planning (02.02)

a. Inspection Scope

The inspectors selected three to five work activities of the highest exposure significance or involve work in high dose rate areas.

The inspectors reviewed the radiological work planning as-low-as-reasonably-achievable (ALARA) evaluations, initial and revised exposure estimates, and exposure mitigation requirements. The inspectors determined if the licensee had reasonably grouped the radiological work into work activities.

The inspectors assessed whether the licensee's planning identified appropriate dose reduction techniques; appropriately considered alternate reduction features; and defined reasonable dose goals. The inspectors evaluated whether the licensee's ALARA assessment had taken into account decreased worker efficiency from use of respiratory protective devices and/or heat stress mitigation equipment. The inspectors determined if

the licensee's work planning considered the use of remote technologies and dose reduction insights from industry and plant-specific operating experience. The inspectors assessed whether these ALARA requirements were integrated into work procedure and/or RWP documents.

These inspection activities constituted a partial sample as defined in IP 71124.02.

b. Findings

No findings were identified.

.2 Verification of Dose Estimates and Exposure Tracking Systems (02.03)

a. Inspection Scope

The inspectors assessed whether the assumptions and basis for the current annual collective exposure estimate were reasonably accurate. The inspectors assessed source term reduction effectiveness and reviewed applicable procedures for estimating exposures from specific work activities.

The inspectors reviewed the assumptions and bases in ALARA work planning documents for selected activities and verified that the licensee has established measures to track, trend, and if necessary to reduce, occupational doses for ongoing work activities.

The inspectors determined whether a dose threshold criteria was established to prompt additional reviews and/or additional ALARA planning and controls and evaluated the licensee's method of adjusting exposure estimates, or re-planning work, when unexpected changes in scope or emergent work were encountered. The inspectors determined if adjustments to exposure estimates were based on sound radiation protection and ALARA principles or if they are just adjusted to account for failures to control the work. The inspectors evaluated whether there was sufficient station management review and approval of adjustments to exposure estimates and that the reasons for the adjustments were justifiable.

These inspection activities constituted a partial sample as defined in IP 71124.02.

b. Findings

No findings were identified.

.3 Implementation of As-Low-As-Reasonably-Achievable and Radiological Work Controls (02.04)

a. Inspection Scope

The inspectors reviewed the radiological administrative, operational, and engineering controls planned for selected radiologically significant work activities and evaluated the integration of these controls and ALARA requirements into work packages, work procedures and/or RWPs.

The inspectors conducted observations of in-plant work activities and assessed whether the licensee had effectively integrated the planned administrative, operational, and engineering controls into the actual field work to maintain occupational exposure ALARA. The inspectors observed pre-job briefings, and determined if the planned controls were discussed with workers. The inspectors evaluated the placement and use of shielding, contamination controls, airborne controls, RWP controls, and other engineering work controls against the ALARA plans.

The inspectors assessed licensee activities associated with work-in-progress to ensure the licensee was tracking doses, performed timely in-progress reviews, and, when jobs did not trend as expected, appropriately communicated additional methods to be used to reduce dose. The inspectors evaluated whether health physics and ALARA staff were involved with the management of radiological work control when in-field activities deviated from the planned controls. The inspectors assessed whether the outage control center and station management provided sufficient support for ALARA re-planning.

The inspectors assessed the involvement of ALARA staff with emergent work activities during maintenance and when possible, attended in-progress review discussions, outage status meetings, and/or ALARA committee meetings.

These inspection activities constituted a partial sample as defined in IP 71124.02.

b. Findings

No findings were identified.

.4 Radiation Worker Performance (02.05)

a. Inspection Scope

The inspectors observed radiation worker and radiation protection technician performance during work activities being performed in radiation areas, airborne radioactivity areas, or high radiation areas to assess whether workers demonstrated the ALARA philosophy in practice and followed procedures. The inspectors observed radiation worker performance to evaluate whether the training and skill level was sufficient with respect to the radiological hazards and the work involved.

The inspectors interviewed individuals from selected work groups to assess their knowledge and awareness of planned and/or implemented radiological and ALARA work controls.

These inspection activities constituted one sample as defined in IP 71124.02.

b. Findings

No findings were identified.

.5 Problem Identification and Resolution (02.06)

a. Inspection Scope

The inspectors reviewed self-assessments and/or audits performed of the ALARA Program and determined if these reviews identified problems or areas for improvement.

The inspectors assessed whether problems associated with ALARA planning and controls were being identified by the licensee at an appropriate threshold and properly addressed for resolution.

These inspection activities constituted one sample as defined in IP 71124.02.

b. Findings

No findings were identified.

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

.1 Engineering Controls (02.02)

a. Inspection Scope

The inspectors reviewed procedural guidance for use of ventilation systems, and assessed whether the systems were used, to the extent practicable, during high-risk activities to control airborne radioactivity and minimize the use of respiratory protection. The inspectors assessed whether installed ventilation airflow capacity, flow path, and filter/charcoal unit efficiencies for selected systems were consistent with maintaining concentrations of airborne radioactivity in work areas below the concentrations of an airborne area to the extent practicable. The inspectors also evaluated whether selected temporary ventilation systems used to support work in contaminated areas were consistent with licensee procedural guidance and ALARA.

The inspectors reviewed select airborne monitoring protocols to assess whether alarms and set points were sufficient to prompt worker action. The inspectors assessed whether the licensee established trigger points for evaluating levels of airborne beta-emitting and alpha-emitting radionuclides.

These inspection activities constituted one sample as defined in IP 71124.03.

b. Findings

No findings were identified.

.2 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

The inspectors assessed whether the licensee provided respiratory protection devices for those situations where it was impractical to employ engineering controls such that occupational doses were ALARA. For select instances where respiratory protection devices were used, the inspectors assessed whether the licensee concluded that further engineering controls were not practical. The inspectors also assessed whether the

licensee had established means to verify that the level of protection provided by the respiratory protection devices was at least as good as that assumed in the work controls and dose assessment.

The inspectors assessed whether the respiratory protection devices used to limit the intake of radioactive materials were certified by the National Institute for Occupational Safety and Health/Mine Safety and Health Administration or have been approved by the NRC. The inspectors evaluated whether the devices were used consistent with their National Institute for Occupational Safety and Health/Mine Safety and Health Administration certification or any conditions of their NRC approval.

The inspectors evaluated whether selected individuals qualified to use respiratory protection devices had been deemed fit to use the devices by a physician.

These inspection activities constituted a partial sample as defined in IP 71124.03.

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

.1 Special Dosimetric Situations (02.05)

a. Inspection Scope

The inspectors reviewed the licensee's methodology for monitoring external dose in non-uniform radiation fields or where large dose gradients exist. The inspectors evaluated the licensee's criteria for determining when alternate monitoring was to be implemented. The inspectors reviewed dose assessments performed using multi-badging to evaluate whether the assessment was performed consistently with licensee procedures and dosimetric standards.

These inspection activities constituted a partial sample as defined in IP 71124.04.

b. Findings

No findings were identified.

4. OTHER ACTIVITIES

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

4OA1 Performance Indicator Verification (71151)

.1 Safety System Functional Failures

a. Inspection Scope

The inspectors sampled licensee submittals for the safety system functional failures performance indicator (PI) for the period from the fourth quarter 2015 through the third 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, and NUREG-1022, "Event Reporting Guidelines 10 CFR 50.72 and 50.73" definitions and guidance, were used. The inspectors reviewed the licensee's operator narrative logs, operability assessments, maintenance rule records, maintenance work orders, issue reports, event reports and NRC Integrated Inspection Reports for the period of October 2015 through September 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 safety system functional failures sample as defined in IP 71151.

b. Findings

No findings were identified.

.2 Mitigating Systems Performance Index—Residual Heat Removal System

a. Inspection Scope

The inspectors sampled licensee submittals for the Mitigating Systems Performance Index (MSPI) - Residual Heat Removal System PI for the period from the fourth quarter 2015 through the third quarter 2016. 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, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of October 2015 through September 2016, 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 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 MSPI residual heat removal system sample as defined in IP 71151.

b. Findings

No findings were identified.

.3 Mitigating Systems Performance Index—Cooling Water Systems

a. Inspection Scope

The inspectors sampled licensee submittals for the MSPI - Cooling Water Systems PI for the period from the fourth quarter 2015 through the third quarter 2016. 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, issue reports, MSPI derivation reports, event reports and NRC Integrated Inspection Reports for the period of October 2015, through September 2016, 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 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 MSPI cooling water system sample as defined in IP 71151.

b. Findings

No findings were identified.

.4 Reactor Coolant System Specific Activity

a. Inspection Scope

The inspectors sampled licensee submittals for the reactor coolant system specific activity PI for Duane Arnold Energy Center for the period from the second quarter 2015 through the second quarter 2016. 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 reactor coolant system chemistry samples, technical specification requirements, Issue Reports, Event Reports and NRC Integrated Inspection Reports 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. In addition to record reviews, the inspectors observed a chemistry technician obtain and analyze a reactor coolant system sample. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one reactor coolant system specific activity sample as defined in IP 71151.

b. Findings

No findings were identified.

.5 Occupational Exposure Control Effectiveness

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Exposure Control Effectiveness PI for the period from the second quarter 2015 through the second quarter 2016. 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 assessment of the PI for occupational radiation safety to determine if the indicator related data was adequately assessed and reported. To assess the adequacy of the licensee’s PI data collection and analyses, the inspectors discussed with radiation protection staff the scope and breadth of its data review and the results of those reviews. The inspectors independently reviewed electronic personal dosimetry dose rate and accumulated dose alarms and dose reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of numerous locked high and very high radiation area entrances to determine the adequacy of the controls in place for these areas. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one occupational exposure control effectiveness sample as defined in IP 71151.

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 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 corrective action program 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.

.2 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 corrective action program item screening discussed in Section 4OA2.1 above, licensee trending efforts, and licensee human performance

results. The inspectors' review nominally considered the 6-month period of July 2016, through December 2016, although some examples expanded beyond those dates where the scope of the trend warranted.

The review also included issues documented outside the CAP in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problems and 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 corrective action program trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

The inspectors and licensee noted a similar trend in procedure quality, especially those referenced by the operations department. Although these deficiencies did not always result in any immediate adverse consequences, a potential trend in these areas is apparent and suggest that additional licensee attention to effect corrective actions may be appropriate. The licensee entered the following potential adverse trend into their CAP during this time period as CR 02168171, "Level 1 Assessment – NRC Concerns with OPS Procedures." Specific examples associated with the procedure quality trend included, but were not limited to:

- On July 20, 2016, the licensee determined the Low Pressure Coolant Injection (LPCI) function was inoperable due to guidance contained in the annunciator response procedure (ARP) which did not agree with TS (CR 02158897).
- Operations referred to the incorrect reactor building closed cooling water outlet temperature reading to ensure prerequisites were satisfied prior to fuel movement. Additionally, the licensee discovered that previous license amendments should have removed reactor building closed cooling water outlet temperature from the procedure and replaced it with the requirement to maintain spent fuel pool temperature (CR 02160826).
- The licensee inappropriately interpreted guidance during performance of their shutdown risk assessment and failed to recognize the potential to enter an orange risk condition. The guidance contained in the shutdown risk management procedure was not supported by any licensing documentation (CR 02162840).
- An ARP contained inappropriate direction to operations crews that the high pressure coolant injection (HPCI)/reactor core isolation cooling (RCIC) vacuum breaker block valves being not fully open, did not make HPCI and RCIC inoperable (CR 02136505).
- Following a Cardox fire suppression system alarm, the NRC inspectors reviewed operations response and noted that the ARP directed the crew to enter the Cardox Technical Requirement Manual Limiting Condition for Operation (TLCO). The inspectors questioned this as the Cardox TLCO had been deleted by a previous license amendment (CR 02154215).

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

b. Findings

No findings were identified.

3. Annual Follow-up of Selected Issues: Low Pressure Coolant Injection Function Declared Inoperable

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors took note of CR 02144746, "1P070 RHR/CS (core spray) Keep Fill Pump Tripped." The inspectors reviewed the CAP document and found the licensee's determination that the RHR/CS keep fill pump was non-functional, and that the RHR/CS systems were operable but degraded, was not appropriate. The inspectors then reviewed the licensee's shift log and noted that while the shift log recorded an unplanned entry into TS Limiting Condition of Operation (LCO) 3.5.1, Condition B, CR 02144746 documented a planned entry into TS LCO 3.5.1, Condition B. The inspectors asked the licensee whether the entry into TS LCO 3.5.1, Condition B was planned or unplanned. The licensee explained that the previous shift had received RHR discharge header low pressure alarms and that the current ARP contained inaccurate information to determine system operability. The previous shift had used this inaccurate ARP to determine that LPCI was inoperable. The licensee further explained that condition evaluation (CE) 01602508 had provided direction that the RHR-LPCI shall be considered inoperable if system pressure indicated on PI-2032 [PI-1962B] is sustained (>10 seconds) below 20 pounds per square inch gauge (psig). The licensee then surmised that since pressure had not be observed below 20 psig, the alarms received in the control room, due to the trip of the RHR/CS keep fill pump, did not mean the RHR system was inoperable. Further details of this portion of the review are described in detail in the finding below.

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

b. Findings

(1) Inadequate Evaluation for a Change to the Low Pressure Coolant Injection Annunciator Response Procedure

Introduction. The inspectors identified a finding of very low safety significance (Green) and an associated Severity Level IV NCV of 10 CFR 50.59, "Changes, Tests, and Experiments," due to the licensee's failure to perform an adequate written evaluation to demonstrate that a procedure change did not require a license amendment. Specifically, the licensee implemented a change to ARP 1C03B C-3, "Residual Heat Removal System 'A' Discharge Header High/Low Pressure," and C-7, "Residual Heat Removal System 'B' Discharge Header High/Low Pressure," that revised the LPCI system operability determination information which impacted the safety-related function of the LPCI system.

Description. On July 20, 2016, the licensee received annunciators 1C03B (C-3), "A RHR [Residual Heat Removal] System Disch[arge] Header Hi/Lo Pressure," and 1C03B (C-7), "B RHR System Disch Header Hi/Lo Pressure." The crew responded to the annunciator using ARP 1C03B, "Reactor and Containment Cooling and Isolation," Revision 42, which directed the crew to declare the LPCI function inoperable and enter unplanned TS LCO 3.5.1, "ECCS [Emergency Core Cooling Systems] – Operating," Condition B, with a

required action to restore the system to operable status within 7 days. The licensee dispatched auxiliary operators to line up and valve in the condensate service water system in accordance with the ARP and Operating Instruction (OI) 149, "Residual Heat Removal System," Revision 153. The licensee repressurized and restored RHR header pressure, cleared the control room annunciators, declared the LPCI function operable and exited LCO 3.5.1, Condition B. The licensee determined that the low pressure condition in the RHR header had been caused by the failure of the RHR/CS keep fill pump. The function of the RHR/CS keep fill pump is to maintain header pressure of the low pressure ECCS systems. The licensee documented the low pressure condition and RHR/CS keep fill pump failure in CR 02144746, "1P070 RHR/CS Keep Fill Pump Tripped."

In preparation for a notification to the NRC for the unplanned inoperability of the LPCI function, the licensee referred to CE 01602508, "RHR Low Pressure Alarm during STP," in which a calculation had been performed using calculation CAL-M03-006, "Appendix R – RHR & CS Keep Fill Calculation," Revision 1. The CE determined, changing a few assumptions, that "the minimum pressure needed to be observed on PI-2032 or PI-1962B [control room RHR header pressure indicators] to assure RHR piping remains at a positive pressure is 19.275 psig." Using this information, the operations shift manager determined that the inoperability call made previously for the LPCI system was invalid. The change in the operability call was based on the fact that when the annunciator was received in the control room, operators continuously monitored RHR discharge header pressure and the pressure never fell below 45 psig as indicated on PI-2032 or PI-1962B. The licensee documented the need to revise the ARP to include the information gained by reviewing CE 01602508 in CR 02144903, "Revision Needed to RHR Low Pressure ARP Actions."

The licensee generated procedure change request (PCR) 02144906, "Batch Change ARP 1C03B and OI-149." As part of the PCR, the licensee completed a 10 CFR 50.59 screening form in accordance with procedure EN-AA-203-1201, "10 CFR Applicability and 10 CFR 50.59 Screening Reviews," Revision 9. On the 10 CFR 50.59 screening form, the licensee answered "no" to the question, "does the proposed activity adversely affect the design function?" The licensee used the results from CE 01602508 for the basis of this answer. The licensee changed the ARP on August 5, 2016, to include the statement that, "RHR-LPCI shall be considered inoperable if system pressure indicated on PI-2032 [PI-1962B] is sustained (>10 seconds) below 20 psig." The value of 20 psig is the closest readable value on PI-2032 or PI-1962B in the control room for the calculated value of 19.275 psig.

The NRC raised concern as to the basis for using calculation CAL-M03-006 for determining the minimum value for maintaining the RHR header and LPCI operability because UFSAR Chapter 5.4.7, "Residual Heat Removal System," states, in part, "each discharge line is monitored by a low-pressure switch [PS-2040B and PS-1955B] and alarm, which ensures the operator that the lines are sufficiently full." The licensee documented the NRC's concern in CR 02158897, "NRC Identified – Evaluate the LPCI 20 psig Operability Limit." The licensee immediately provided shift orders to the operations crews to "pressurize the RHR system with condensate service water per OI-149 in the event that system pressure as measured on PI-2032 or PI-1962B reaches 60 psig which will preclude reaching the ARP 1C03B C-3 and C-7 alarm setpoint." The licensee performed CE 02158897, Revision 2, which determined that the calculation of record for the low-pressure switches was calculation CAL-E91-004, "Setpoint Calculation for RHR/LPCI Discharge Line Monitoring (Keep Fill) Instrumentation Pressure Switched

PS-1955B & PS-2040B,” Revision 1. The licensee re-performed the calculation for PI-2032 and PI-1962B in accordance with calculation CAL-E91-004 and determined the minimum pressure as read on the pressure indicators to ensure LPCI function was 29.7 psig. The inspectors determined that in using calculation CAL-M03-006 to determine minimum pressure, the licensee failed to take into account instrument and calibration equipment accuracies, as well instrument drift. This resulted in a non-conservative RHR header pressure being included in the ARP used to determine operability and, therefore, adversely affected the LPCI design function.

Surveillance requirement 3.5.1.1 states, in part, that “the ECCS injection/spray subsystem is OPERABLE when it is sufficiently filled with water. Acceptance criteria are established for the volume of accumulated gas at susceptible locations. If accumulated gas is discovered that exceeds the acceptance criteria for the susceptible location (or the volume of accumulated gas at one or more susceptible locations exceeds an acceptance criteria for gas volume at the suction or discharge of the pump), the Surveillance is not met.” The licensee vented the LPCI system’s susceptible locations in accordance with established procedures on July 20, 2016, and noted that no voids were present at the time. Using these results, the licensee determined the LPCI function was never inoperable. The licensee’s planned corrective actions included removing any reference to PI-2032 and PI-1962B from the ARP and aligning the LPCI operability criteria with those contained in the TS and TS Bases.

Analysis. The inspectors determined that the failure to provide an adequate evaluation that documented the basis for determining that the change to ARP 1C03B did not require a license amendment was a performance deficiency. The performance deficiency was determined to be more than minor safety significance in accordance with IMC 0612, Appendix B, “Issue Screening,” dated September 7, 2012, because it resulted in a non-conservative RHR header pressure being included in the ARP for use in assessing LPCI function operability, impacted the Mitigating Systems cornerstone attribute of procedure quality, and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences.

The inspectors applied IMC 0609, Attachment 4, “Initial Characterization of Findings,” issued October 7, 2016, to this finding. The inspectors answered “No” to all questions within Table 3, “SDP Appendix Router,” and transitioned to IMC 0609, Appendix A, “The SDP for Findings At-Power,” issued June, 19, 2012. The inspectors answered “No” to all the questions contained in Exhibit 2, “Mitigating Systems Screening Questions,” and therefore, the finding screened as very-low safety significance (Green).

The inspectors determined this finding was associated with the cross-cutting aspect of design margins in the human performance cross-cutting area, and involved margins being carefully guarded and changed only through a systematic and rigorous process. Specifically, in calculating the operability pressure for the LPCI function in accordance with a non-design basis document, CAL-M03-006, instead of the design basis calculation of record, CAL-E91-004, the licensee made a decision to proceed with implementation of a change to the ARP from the results of a condition evaluation in lieu of following their systematic and rigorous process for evaluating changes to the UFSAR [H.6].

Enforcement. Title 10 of the CFR, Section 50.59(d)(1), "Changes, Test, and Experiments," requires, in part, that the licensee shall maintain records of changes in the facility, of changes in procedures, and of tests and experiments and must include a written evaluation which provides the bases for the determination that the change, test, or experiment does not require a license amendment.

Contrary to the above, on August 5, 2016, the licensee failed to maintain records of changes to procedures that included a written evaluation that provided the basis for determining that the change did not require a license amendment. Specifically the licensee used information provided in calculation CAL-M03-0006, a non-design basis calculation, to change the LPCI operability determination information provided in ARP 1C03B C-3, "Residual Heat Removal System 'A' Discharge Header High/Low Pressure," and C-7, "Residual Heat Removal System 'B' Discharge Header High/Low Pressure," rather than using information in design basis calculation CAL-E91-004. The use of the incorrect information impacted the LPCI system's function.

Corrective actions included providing the operating crews orders to preclude challenging the low pressure coolant injection function, plans to remove any reference to PI-2032 and PI-1962B from the associated ARPs, and aligning LPCI operability criteria with those contained in TS and the TS Bases.

Violations of 10 CFR 50.59 are dispositioned using the traditional enforcement process instead of the significance determination process (SDP) because they are considered to be violations that potentially impede or impact the regulatory process. In accordance with Section 6.1.d.2 of the NRC Enforcement Policy, this violation was categorized as Severity Level IV because the resulting changes were evaluated by the SDP as having very low safety significance. Because this violation was of very low safety significance and because the issue was entered into the licensee's CAP as CR 02158897, consistent with Section 2.3.2 of the Enforcement Policy, it is being treated as a NCV.

(NCV 05000331/2016004-02; Inadequate Evaluation for a Change to the Low Pressure Coolant Injection Annunciator Response Procedure)

4OA6 Management Meetings

.1 Exit Meeting Summary

- On January 5, 2017, the inspectors presented the inspection results to Mr. T. Vehec and other members of the licensee staff. The licensee acknowledged the issues presented.
- On January 19, 2017, the inspectors presented revised results of two findings to Mr. D. Curtland and 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. Morgan, Radiation Protection Manager, on October 7, 2016;
- The results of the Inservice Inspection with Mr. T. Vehec, Site Vice President, staff on October 12, 2016; and
- The Annual Review of EAL and Emergency Plan Changes with Mr. M. Fritz, Emergency Preparedness Manager, on December 16, 2016.

The inspectors confirmed that none of the potential report input discussed was considered proprietary. Proprietary material received during the inspection was returned to the licensee.

4OA7 Licensee-Identified Violations

The following violations of very low significance (Green) or Severity Level IV were identified by the licensee and are violations of NRC requirements which meet criteria of the NRC Enforcement Policy for being dispositioned as NCVs.

- Title 10 of the CFR, Section 20.2207(g), requires, in part, that each licensee reconcile the inventory of nationally tracked sources possessed by the licensee against that licensee's data in the National Source Tracking System (NSTS). The reconciliation must be conducted during the month of January each year. The reconciliation process must include resolving any discrepancies between the NSTS and the actual inventory by filing the reports identified by paragraphs (a) through (e) of 10 CFR 20.2207. By January 31 of each year, each licensee must submit to the NSTS confirmation that the data in the NSTS is correct.

Contrary to the above, the licensee failed to reconcile the inventory of its nationally tracked source against the licensee's data in the NSTS during the month of January in 2010 through 2016. The licensee documented this issue in CR 02160545 and corrected the error in the previously filed reports within five business days of the discovery of the error. This failure to comply with reporting requirements may impact the ability of the NRC to perform its regulatory oversight function and therefore, it is subject to the traditional enforcement in accordance with the NRC Enforcement Policy. This is a Severity Level IV violation in accordance with Section 6.9.d.2 of the NRC Enforcement Policy.

- Title 10 of the CFR, Section 50.54(m)(2)(iii), "Condition of Licenses," states that when a nuclear power unit is in an operational mode other than cold shutdown or refueling, as defined by the unit's TS, each licensee shall have a person holding a senior operator license for the nuclear power unit in the control room at all times. Technical Specification 5.1.2, "Responsibility," states, in part, that "during any absence of the Operations Shift Manager [OSM] while the unit is in Mode 1, 2, or 3, an individual with an active Senior Reactor Operator (SRO) license shall be designated to assume the control room command function." Contrary to the above, at approximately 1:37 p.m. on December 1, 2016, with the unit in Mode 1, the OSM left the control room without designating another SRO to assume the control room command function. The Command SRO function was vacant for approximately 4 minutes.

This issue was documented in CR 02172138. There were no risk-significant plant evolutions in progress and no adverse reactor plant operations occurred during the SROs absence. The inspectors screened the issue using IMC 0609, Appendix A, "The Significance Determination Process for Findings at Power." The inspectors reviewed the screening questions under all three Cornerstones and all questions did not apply; therefore, the finding screened as having a very low safety significance.

- Title 10 of the CFR, Appendix B, Criterion V, "Instructions, Procedures and Drawings," requires activities affecting quality shall be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished. Contrary to the above, on October 7, 2016, the licensee failed to accomplish all the prerequisites of procedure RFO 403, "Performance of Fuel Handling Activities," prior to commencing fuel movement.

This was entered into the licensee's CAP as CR 02160826. The inspectors screened this issue using IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings," dated May 9, 2014, and determined this finding to be of very low safety significance (Green) because all of the barrier integrity screening questions were answered no.

- Title 10 of the CFR, Section 50.65(a)(4), requires that the licensee shall assess and manage the increase in risk that may result from proposed maintenance activities. Contrary to the above, on October 15, 2016, the licensee failed to assess and manage the increase in risk that may result from proposed maintenance activities. Specifically, the licensee failed to evaluate a potential change in risk from yellow to orange while implementing procedure OM-AA-101-1000, "Shutdown Risk Management (DAEC Specific information)," concurrently with a time to boil of less than 24 hours due to an unclear procedure note.

The licensee initiated CR 02162840 to revise the procedure note and assess if there had been a change in shutdown risk from yellow to orange. The inspectors screened this issue using IMC 0609, Appendix K, "Maintenance Risk Assessment Significance Determination Process," and IMC 0609, Appendix G, Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Initial Screening and Characterization of Findings," and determined the finding was of very low safety significance because the licensee evaluation demonstrated that there had been no actual change in risk from yellow to orange.

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
R. Severson, BWRVIP Engineer
D. Slivon, ISI Programs Engineer
F. Dohmen, NDE Level III
M. Strobe, Operations Director

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

05000331/2016004-01	NCV	Failure to Control Emergency Preparedness Drill Scenario (Section 1EP6)
05000331/2016004-02	NCV	Inadequate Evaluation for a Change to the Low Pressure Coolant Injection Annunciator Response Procedure (Section 4OA2)

Closed

05000331/2016004-01	NCV	Failure to Control Emergency Preparedness Drill Scenario (Section 1EP6)
05000331/2016004-02	NCV	Inadequate Evaluation for a Change to the Low Pressure Coolant Injection Annunciator Response Procedure (Section 4OA2)

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

- Abnormal Operating Procedure (AOP) 903; Severe Weather; Revision 59
- OP-AA-102-1002; Plant Winterization Checklist; Revision 15
- OP-AA-102-1002; Plant Winterization Checklist; (DAEC-Specific Attachment); NG-270K; Revision 15
- CR 02165940; EOC (Enercon)-Positive Recognition-GE Mitigation Mod
- CR 02165455; Level 1 Assessment 2165452 Recommendations for TSC DG FA
- CR 02165452; Level 1 Assessment 2152217-01 Due Date Extensions
- CR 02152217; Tank Heater For 1G100 Not Working

1R04 Equipment Alignment

- OP-AA-102-1003; Guarded Equipment; Revision 18
- Drawing BECH-M113; P.&I.D. RHR Service Water & Emergency Service Water Systems; Revision 76
- Drawing BECH-M146; P.&I.D. Service Water System Pumphouse; Revision 89
- OI 416A1; Residual Heat Removal Service Water (RHRSW) System Electrical Lineup; Revision 6
- OI 416A2; 'A' RHRSW System Valve Lineup and Checklist; Revision 12
- OI 416A4; 'B' RHRSW System Valve Lineup and Checklist; Revision 12

1R05 Fire Protection

- EN-AA-202-1004; Fire Protection Screening; Revision 3
- ACP 1412.4; Impairments to Fire Protection Systems; Revision 79
- FHA-400; Fire Protection Program- Fire Hazards Analysis; Revision 21
- Pre-Fire Plan (PFP)-RB-757; Pre-Fire Plan Reactor Building Elevation 757; Revision 2
- PFP-TB-780; Pre-Fire Plan Turbine Building Elevation 780; Revision 3
- PFP-RR-001; Pre-Fire Plan Radioactive Release; Revision 0
- PFP-IS-757; Pre-Fire-Plan Intake Structure; Revision 0
- PFP-LL-757; Pre-Fire-Plan [low level rad processing and storage facility] LLRPSF; Revision 1
- PFP-CB-772; Pre-Fire Plan Control Building El. 772; Revision 1
- CR 02166689; OP020 PCV 4150A Steam Leak from Flange

1R08 Inservice Inspection Activities

- STP 3.6.1.1-01; Suppression Chamber and Drywell Visual Examination; Revision 16
- VNDR-16-026; Fully Encoded Phased Array Ultrasonic Examination of Dissimilar Metal Piping Welds; Revision 0
- VNDR-16-024; Encoded Phased Array Ultrasonic Examination of Small Bore Austenitic Socket Welds; Revision 0
- VNDR-16-021; QCP-10-5-DAEC Application and Inspection of Vapor Region Coating Repair with UT-15; Revision 0

- VNDR-16-023; Performance of Phased Array Instrument Screen Height and Amplitude Control Linearity Checks; Revision 0
- FP-PE-WLD-01; Welding Manual Program Control; Revision 5
- EN-AA-203-1001; Operability Determinations/Functionality Assessments; Revision 22
- ACP 1211.14; Nondestructive Examination Procedure Radiographic Examination RT-1; Revision 10
- ACP 1601; Application of Protective Coatings; Revision 12
- ACP 1602; Specification for Protective Coatings in Areas Outside the Primary Containment; Revision 14
- ACP 1603; Protective Coatings for Service Level 1 Applications Inside the Reactor Containment; Revision 6
- ACP 1211.13; NDE Procedure for Liquid Penetrant PT-1; Revision 13
- SSPC-SP-11; Surface Preparation Specification No. 11; November 1, 2004
- UT-15 Underwater Epoxy Coating Technical Data Sheet
- Program Engineering ASME Section XI Administrative Manual; Revision 16
- UT-PDA-16-006; UT Calibration/Examination LCA-F002 Nozzle-Safe End Weld; October 11, 2016
- WPS FP-PE-B31-P1P1-GTSM-001; Welding Procedure Specification; Revision 3
- WPS FP-PE-B31-P1P1-GTSM-I-078; Welding Procedure Specification; Revision 1
- GMP 102-311-GS-PWHT; Procedure Qualification Record; August 3, 1987
- WPS SM-1-1; Procedure Qualification Record; January 2, 1978
- WP-6; Procedure Qualification Record; January 8, 1991
- W-104; Procedure Qualification Record; March 1, 2001
- Engineering Change (EC) 280489; Install 4" Alternate Injection Line on to 18" GBB-4; Revision 0
- EC 281991; Install Hardened Vent Pipe; Revision 0
- ISO-HLE-042-01; Isometric Reactor Building Hardened Vent System; Revision 0
- VE-PDA1-16-01; Ultrasonic Examination; October 11, 2016
- BOP-RT-16-005; Radiographic Examination; October 10, 2016
- BOP-RT-16-006; Radiographic Examination; October 10, 2016
- VE-PDA1-16-002; Ultrasonic Examination; October 11, 2016
- VE-PDA1-16-003; Ultrasonic Examination; October 11, 2016
- UT-07-107; UT Supplemental Report; March 1, 2007
- UT-07-108; UT Calibration/Examination; March 1, 2007
- WO 40201185-02; MO2009 Inspect and Replace
- WO 40387396-44; Install Hardened Vent Pipe
- WO 40376987-02; Install 4" Alternate Injection Line on to 18" GBB-4
- WO 40346081-01; Primary Containment – Torus Vapor Phase Coating
- WO 40399602-01; EC 0285185: Remove Hanger HBD-025-+H-07 from the Field
- WO 40201184-01; MO1935 Replace RHR Pump's Minimum Flow Bypass Valve
- WO 40283967-01; MO1935 Perform Radiography
- WO 40365400-01; CV 4306 Perform NDE on Stud #1 to Satisfy RFO-24 R&R Plan
- CR 02161170; Observation by NRC on RHR Suction Line
- CR 02162041; NRC Observation RT Data Reports During RF025
- CR 02027076; Inconsistency in EN-AA-203-1001 Based on Compliance
- CR 02000461; Linear Indication Found in Loopseal Weld
- CR 02001792; MO1040 Valve Install Problems
- CR 01999542; NRC Identified Issue with ACP 1211.4 PT Procedure
- CR 02031207; Actions Required for Support HBD-25-H-7
- CR 02001501; ISI of HBD-25-7 in Pumphouse Has Loose Hanger Rod
- CR 01998337; Radiography Revealed Unacceptable Indication in W3
- CR 01998374; Scope Expansion per ASME Section XI GBC-4-H-37 SUS16.00

- CR 01997919; ISI Determined that Snubber Fluid Level Low on HBD-031-SS-71
- CR 01999596; NRC Identified Issue with Procedure ACP 211.3 PT Procedure
- CR 02002746; Rejectable Indication on Disk
- CR 02020658; Missed Surface Examination of Replaced Flange Stud

1R11 Licensed Operator Requalification Program

- OP-AA-100-1000; Conduct of Operations; Revision 19
- AD-AA-100-1006; Procedure and Work Instruction Use and Adherence; Revision 11
- OP-AA-103-1000; Reactivity Management; Revision 5
- STP 3.1.3-01; Control Rod Exercise; Revision 1
- Simulator Exercise Guide PDA OPS ESG 184; Revision 0
- Simulator Exercise Guide PDA OPS SEG 2016E-01S; Revision 1
- AOP 255.1; Control Rod Movement/Indication Abnormal; Revision 46
- STP 3.4.9-01; Heat up and Cooldown Rate Log; Revision 18
- IPOI 2; Startup; Revision 152
- Reactivity Management Plan RFO-25; Revision 0
- Reactivity Management Plan BOC 26; Revision 0
- OI 693.3; Turbine Lube Oil and Turning Gear System; Revision 47
- OI 672; Offgas and Recombiner System; Revision 95
- OI 410; River Water Supply System; Revision 77
- OI 692; Turbine Steam Seal System; Revision 23
- OI 691; Condenser Air Removal System; Revision 62
- OI 698; Main Generator System; Revision 93
- OI 644; Condensate and Feedwater Systems; Revision 170
- OI 149; Residual Heat Removal System; Revision 158
- OI 152; High Pressure Coolant Injection System; Revision 114
- OI 856.1; Reactor Manual Control System; Revision 48
- OI 878.1; Source Range Neutron Monitoring System; Revision 20
- OI 878.2; Intermediate Range Neutron Monitoring System; Revision 25
- OI 693.1; Main Turbine and Turbine Control; Revision 83
- OI 695.2; Generator Hydrogen and Carbon Dioxide System; Revision 57
- OI 563; Hydrogen Water Chemistry System; Revision 72

1R12 Maintenance Effectiveness

- ER-AA-100-2002; Maintenance Rule Program Administration; Revision 3
- 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
- CR 02162699; MO2046 Documenting As Found Conditions
- WO 40390068; 1P201B: Remove, Overhaul, and Reinstall Recirc Pump Seal Assembly
- PUMP-B580-02; Equipment-Specific Maintenance Procedure Pump-B580-02 Byron Jackson Seal Cartridge Removal and Installation; Revision 12
- Drawing BECH-M116; P. & I. D. Reactor Recirculation System; Revision 69
- Drawing APED-B31-2816-048; Duane Arnold Cartridge Modifications for AECL CAN2A Seal; Revision 1
- Drawing APED-B31-2816-049; AECL CAN2A – Converted RRP Seal Assembly for Duane Arnold; Revision 1
- CR 02160245; Replacement Rebuilt Seal Cartridge Failed Hydrostatic Test
- CR 02160648; Recirc Pump Seal Interseal Pressure High During Hydro

- CR 02164693; 1P201B Recirc #2 Seal Pressure Approach Seal #1 Pressure
- CR 02166174; Initial Seal Setting Dimension was Initially Out of Tolerance
- CR 02166331; Errors in Recirculation Pump Vendor Manual/Drawing
- CR 02159721; Pressure Reducing Cell V-73521 Dimension
- WO 40391783; MO 1947 "B" RHRSW Outlet Indicates Dual When Closed
- WO 40374990; MO 2046-0 Lube And Inspect

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
- OP-AA-104-1007; Online Aggregate Risk; Revision 4
- WM-AA-1000; Work Activity Risk Management; Revision 8
- OP-AA-102-1003; Guarded Equipment; Revision 8
- Work Week 1542 Work Activity Risk Management (WARM) Summary and Weekly Probabilistic Risk Analysis (PRA); Revision 1, 2, and 3
- 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
- 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
- WO 40389555; Routine Inspection and Testing (CB4290)
- STP 3.4.9-01; Heatup and Cooldown Rate Log; Revision 18
- OM-AA-101-1000; Shutdown Risk Management; Revision 11
- OM-AA-101-1000(DAEC); Shutdown Risk Management; Revision 19
- MUMARC 91-06; Guidelines for Industry Actions to Assess Shutdown Management, December 1991
- CR 2162840; Unclear Guidance for Time-to-Boil Calculation
- OM-AA-101-1000 (DAEC); Shutdown Risk Management (DAEC Specific Information); Revision 19
- PDA-PRAE-16-008; Justification for Potential Orange Risk Result in RFO-25 to Remain as Yellow; Revision 0
- PDA-PRAE-16-007; Condition Evaluation for Time-to-Boil Calculation Guidance in DAEC Shutdown Risk Management Procedure; Revision 0

1R15 Operability Evaluations

- EN-AA-203-1001; Operability Determinations/Functionality Assessments; Revision 23
- OP-AA-105-1000; Operational Decision-Making; Revision 4
- CR 02162826; Degraded Coating Area in Torus Immersion Phase Identified
- CAL-A11-001; Carborguard 6250N Service Level 1 Coating Qualification for the Suppression Chamber; Revision 0
- CR 02160826; RFP 403 Checklist Requirements Not Met

- CR 02161308; MO 4424 (main steam line drain outboard isolation) Failed [local leak rate test] LLRT
- CR 02161307; MO 4423 (main steam line drain inboard isolation) Failed [local leak rate test] LLRT

1R18 Plant Modifications

- WO 40481106-09; Well Water Temporary Modification
- EC 287222; Temporary Change in Support of Maintenance Evaluation; Revision 0
- STP NS790302; Liquid Process Rad Monitor Inop Sampling and Analysis; Revision 19
- WO40481106-09; Well Water Temporary Modification
- 287222; Well Water Temporary Modification
- FLEX-AB-100-1000; Guidance for FLEX Equipment When It Is Unavailable; Revision 0
- FLEX-AB-100-1001; FLEX Equipment Use During Non-Emergency; Revision 01
- FLEX-AB-100-1002; FLEX Site SAFER Playbook; Revision 1
- SBO-Station Blackout ;Revision 0
- AOP 301.1; Station Blackout; Revision 64
- SAMP 724; FLEX Damage Assessment And Portable Equipment Deployment; Revision 0
- SAMP 730; FLEX Guidance For RCIC Use During A Beyond Design Basis External Event; Revision 0
- SEP 301.3 Torus Vent Via Hard Pipe Vent; Revision 9

1R19 Post-Maintenance Testing

- MD-024; Post Maintenance Testing Program; Revision 83
- MD-062; Work Order Task(s); Revision 15
- WO 40417619-04; Hydrogen Seal Oil Vacuum Pump
- WO 40389153; SBLC Check Valve Replacement
- WO 40448668-02; PMT: Perform STP 3.8.7-01 Transfer 1B34A/44A to 1B34
- WO 40432898-01; STP 3.8.1-06A A-SBDG Operability Test (Fast Start)
- WO 40354636-03; CV 4910A, Perform STP NS100104
- CR 02129940; CV 4910A NS10014 Closing Time
- WO 40416278-02; TCX 6935A – OPS Perform STP 3.7.5-01 for ‘A’ Chiller
- WO 40389687-02; Perform LLRT CV 4307
- CR 02166332; CV 4307 [drywell purge valve] Exceeded Limit On Shaft Seal Leakage
- CR 02166350; Overhaul of CV 4307 Performed By Crane Valve
- CR 02166355; CV 4307 Margin Evaluation
- WO 40493193-04; MO4423 Disassemble, Inspect And Repair
- WO 40388806; “A” RHR System Functional Test
- STP 3.3.5.1-15A “A” RHR Logic System Functional Test
- WO 40388818-04; RFO-25 Return to Service Level 3 Tasks PMT

1R20 Refueling and Other Outage Activities

- RFP 110; Reactor Pressure Disassembly; Revision 44
- IPOI 3; Power Operations (35%-100% Rated Power); Revision 151
- IPOI 4; Reactor Shutdown; Revision 132
- IPOI 8; Outage and Refuel Operations; Revision 88
- STP 3.6.1.1-04; Containment Isolation Valve Leak Tightness Test; Revision 35
- STP 3.6.1.1-04; Containment Isolation Valve Leak Tightness Test; Revision 36
- CR 2161167; CV4415 Failed Local Leak Rate Test
- STP 6.6.1.1-01; Suppression Chamber and Drywell Visual Examination; Revision 16

- STP 3.3.5.1; "A" RHR LSFT; Revision 11
- CR 2161854; CV 4307 Inboard Flange O-Ring Failed LLRT; Revision 22
- STP 3.8.1-07A; "A" LOOP-LOCA Test
- WO 40346081-01; Primary Containment – Torus Vapor Phase
- Article IWE-3000 ASME Section XI Division I; Acceptance Standards; 2001
- BECH-MO43; Suppression Chamber Plan, Sections and Penetrations; Revision 26
- STP 3.10.1-01; Non-Nuclear Heat Class 1 System Leakage Pressure Test; Revision 49
- IPOI 2; Start-Up; Revision 152
- BOC 26; Reactivity Management Plan, Revision 0
- AOP 255.1; Control Rod Movement/Indication Abnormal; Revision 46
- STP 3.4.9-01; Heat Up and Cool Down Rate Log; Revision 18
- OI 693.3; Turbine Lube Oil and Turning Gear System, Revision 47
- OI 672; Offgas and Recombiner System; Revision 95
- OI 410; River Water Supply System; Revision 77
- OI 692; Turbine Steam Seal System; Revision 23
- OI 691; Condenser Air Removal System; Revision 93
- OI 644; Condensate and Feedwater Systems; Revision 170
- PO 149; Residual Heat Removal System; Revision 158
- OI 152; High Pressure Coolant Injection System; Revision 114
- OI 856.1; Reactor Manual Control System; Revision 48
- OI 878.1; Source Range Neutron Monitoring System; Revision 20
- OI 878.2; Intermediate Range Neutron Monitoring System; Revision 25
- OI 693.1; Main Turbine and Turbine Control
- OI 695.2; Generator Hydrogen and Carbon Dioxide System, Revision 57
- OI 563; Hydrogen Water Chemistry System; Revision 72

1R22 Surveillance Testing

- ACP 107; Surveillance Tests; Revision 23
- 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 115
- CR 02059993; "B" SBDG Oil Leak
- CR 02061661; Evaluate STPs That Have Us Enter and Exit Equipment LCOs
- STP 3.1.7-02a; "A" SBLC System Initiation and Explosive Valve Test; Revision 22
- STP 3.8.1-07A; 'A' LOOP-LOCA Test; Revision 22
- NS510001; Core Spray Check Valve Operability Test (Refueling); Revision 4
- NS590011; ASME In-Service Check Valve Air Testing; Revision 9
- NS930003; Main Turbine Overspeed Trip System Tests; Revision 17

1EP4 Emergency Action Level and Emergency Plan Changes

- Duane Arnold Energy Center Emergency Plan
- EP-AA-100-1007; Evaluation of Changes to the Emergency Plan, Supporting Documents and Equipment (10 CFR 50.54(Q)); Revision 3
- EAL Basis Document (EBD) H; Hazards & Other Conditions Affecting Plant Safety; Revisions 12 and 13
- Emergency Plan Implementing Procedures (EPIP) 4.5; Administration of Potassium Iodide; Revisions 10 and 11
- EPIP 6.1; Drill and Exercise Program; Revisions 5 and 6

- MIDAS-01; MIDAS Operations; Revisions 11 and 12
- NOTE-07; Basic Notification Flowpath; Revisions 13 and 14
- NOTE-01; ERO Notification – Phone System Callout; Revisions 12 and 13
- Emergency Offsite Facility (EOF)-08; RAD & EOF Manager Position Specific Checklist; Revisions 16 and 17
- EBD F; Fission Product Barrier Degradation; Revisions 8 and 9
- EPIP 3.3; Dose Assessment and Protective Action; Revisions 32 and 33
- AOP 914; Security Events; Revisions 2 and 3
- PCR 02001211; 10 CFR 50.54(q) Screening Form, EBD H, “Hazards & Other Conditions Affecting Plant Safety” Screen; July 15, 2015
- PCR 02016235; 10 CFR 50.54(q) Screening Form, EPIP 4.5, “Administration of Potassium Iodide” Screen; September 22, 2015
- PCR 02053132 and 196851410; CFR 50.54(q) Screening Form, EPIP 6.1; “Drill and Exercise Program” Screen; September 8, 2015
- PCR 02052974; 10 CFR 50.54(q) Screening Form, EPIP Form MIDAS-01 Screen; September 21, 2015
- PCR 01960492; 10 CFR 50.54(q) Screening Form, EPIP Form NOTE-07 Screen; September 17, 2015
- PCR 02060663; 10 CFR 50.54(q) Screening Form, EPIP Form NOTE-01 Screen; September 21, 2015
- PCR 02060858; 10 CFR 50.54(q) Screening Form, EPIP Form PAR-01 Screen; December 2, 2015
- PCR 02072580; 10 CFR 50.54(q) Screening Form, EPIP Form EOF-48 Screen; December 1, 2015
- PCR 02074908; 10 CFR 50.54(q) Screening Form, EPIP Form EBD F Screen; December 1, 2015
- PCR 02074908 and 2072847; 10 CFR 50.54(q) Screening Form, EPIP 3.3, “Dose Assessment and Protective Action” Screen; December 1, 2015
- PCR 02068437 and 2028854; 10 CFR 50.54(q) Screening Form, AOP 914, “Security Events” Screen; March 24, 2016
- PCR 0211422 and 2120762; 10 CFR 50.54(q) Screening Form, EOF-08, “RAD & EOF Manager Position Specific Checklist” Screen; May 4, 2016
- PCR 02096801; 10 CFR 50.54(q); Screening Form, EPIP Form CR-03, “Dose Assessment and Protective Action” Screen; April 20, 2016
- CR 02126257; Emergency Facilities Staffing and Activation; August 18, 2016
- CR 02060060; Timely Completion of Revision to EAL Basis Document H; July 14, 2015
- CR 02062546; EP Procedure Inconsistencies; July 24, 2015
- CR 02103433; Boundary Change to Emergency Planning Zone; January 18, 2016
- CR 02116737; EP Staff Augmentation LAR (TSCR-149); March 11, 2016

1EP6 Drill Evaluation

- Emergency Response Organization Training Drill December 7, 2016; 16TD3; Revision 0
- CR 02153499; 16TD2 – TSC EC did not Provide a Timely TSC Update on Steamjet Air Ejector; August 31, 2016
- CR 02153517; 16TD2 – TSC, Incorrect Information Posted on ESB; August 31, 2016
- CR 02153553; 16TD2 – Controller Interjection to Remind Shift Communicator; August 31, 2016
- CR 02156680; Information Sharing to ERO for EAL Declaration Protocol; September 19, 2016
- EP-AA-101-1000-1001; Nuclear Division Drill and Exercise Objectives and Demonstration Criteria; Revision 5f

- EPDM 1010; EP Department PIs; Revision 26
- EPDM 1024; Table-top Drills; Revision 2

2RS1 Radiological Hazard Assessment and Exposure Controls

- CR 02076301; Level 1 Assessment - NRC Insp Preps IP 71124.01/.02; September 24, 2015
- RP-AA-100; Radiation Protection Administrative Program; Revision 5
- RP-AA-102-1000; Alpha Monitoring; Revision 2
- RP-AA-102-1001; Area Radiological Surveys; Revision 2
- RP-AA-103-1002; High Radiation Areas; Revision 6
- RP-AA-103-1005; Radiography Operations; Revision 3
- RP-AA-107-1003; Unconditional and Conditional Release of Material; Revision 2
- HPP 3104.01; Additional Control of Access to High Radiation Areas and Above; Revision 59
- Work Order Package; 40415041-01; Sealed Source Leakage Test; July 30, 2016
- CR 02160545; Category 2 Source Not Listed in NRC Database; October 5, 2016
- CR 02160699; Inadequate LHRA Briefings – NRC Identified; October 6, 2016

2RS2 Occupational ALARA Planning and Controls

- RP-A-104; ALARA Program; Revision 5
- RP-AA-104-1000; ALARA Implementing Procedure; Revision 11
- RP-AA-104-1001; Sentinel RWP Writer's Guide; Revision 4
- HPP-3101.05; Administration of RWPs; Revision 56
- HPP 3102.03; Radiation Protection Job Planning; Revision 42
- RWP and Associated ALARA File; RWP 16-3014; All Cavity Work: RFO-25; Various Dates
- Radiation Work Permit and Associated ALARA File; RWP 16-4006; Helper Activities in Support of Drywell – RFO-25; Various Dates
- Radiation Work Permit and Associated ALARA File; WP 16-4252; SRM and IRM Removal in Support of Drywell Refuel Outage 25; Various Dates

2RS3 In-Plant Airborne Radioactivity Control and Mitigation

- ACP 1411.20; Respiratory Protection; Revision 38
- HPP 3106.03; Description of Respiratory Protection Equipment; Revision 18

2RS4 Occupational Dose Assessment

- ACP 1411.18; Personnel Dosimetry; Revision 41

4OA1 Performance Indicator Verification

- DAEC MSPI Basis Document; Revision 17
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; Occupational Exposure Control Effectiveness; Second Quarter 2015; July 10, 2015
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; Occupational Exposure Control Effectiveness; Third Quarter 2015; October 13, 2015
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; Occupational Exposure Control Effectiveness; Fourth Quarter 2015; January 20, 2016
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; Occupational Exposure Control Effectiveness; Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; Occupational Exposure Control Effectiveness; First Quarter 2016; April 13, 2016

- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; Occupational Exposure Control Effectiveness; Second Quarter 2016; July 20, 2016
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; RCS Activity (RCSA); Second Quarter 2015; July 10, 2015
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; RCS Activity (RCSA); Third Quarter 2015; October 11, 2015
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; RCS Activity (RCSA); Fourth Quarter 2015; January 19, 2016
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; RCS Activity (RCSA); First Quarter 2016; April 13, 2016
- Reactor Oversight Process; NRC PI Data Calculation, Review and Approval; RCS Activity (RCSA); Second Quarter 2016; July 20, 2016

40A2 Identification and Resolution of Problems

- OP-AA-100-1002; Plant Status Control Management; Revision 10
- 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 17
- PI-AA-103; Human Performance Program; Revision 5
 - PI-AA-103-1000; Human Performance Program Error Reduction Tools; Revision 5
- PI-AA-104-1000; Corrective Action; Revision 12
- OP-AA-101-1000; Clearance and Tagging; Revision 19
- EN-AA-203-1201; 10 CFR Applicability and 10 CFR 50.59 Screening Reviews; Revision 9
 - Drawing BECH-M120; P.&I.D. Residual Heat Removal System; Revision 68
- Drawing APED-H21-016<1>; RHR CH A; Revision 9
- Drawing ISO-DBB-001-01; RHR Heat Exchanger Discharge (S.E.); Revision 4
- Drawing ISO-GBB-004-01; RHR Heat Exchanger Discharge (S.E.); Revision 2
- Drawing ISO-GBB-004-02; RHR Heat Exchanger Discharge (S.E.); Revision 1
- Drawing ISO-GBB-004-03; RHR Heat Exchanger Discharge (S.E.); Revision 1
- Drawing ISO-GBB-004-04; RHR Heat Exchanger Discharge (S.E.); Revision 1
- Drawing ISO-GLE-007-01; RHR Heat Exchanger Discharge (S.E.); Revision 1
- Drawing ISO-GLE-007-02; RHR Heat Exchanger Discharge (S.E.); Revision 2
- CR 01602508; RHR Low Pressure Alarm During STP
- CR 01602604; RHR Low Pressure ARP LCO Entry Criteria
- CR 01610444; Vulnerability to RHR Gas Intrusion
- CR 01610545; ARP 1C03B, Reactor and Containment Cooling and Isolation
- CR 02124259; Gas/Air Was Noted During RHR System Water Fill Test
- CR 02130565; Gas/Air Was Noted During RHR System Water Fill Test
- CR 02144746; 1P070 RHR/CS Keep Fill Pump Tripped
- CR 02144903; Revision Needed to RHR Low Pressure ARP Actions
- CR 02144906; Batch Change ARP 1C03B and OI 149
- CR 02144907; OI 149 – Residual Heat Removal System
- CR 02158897; NRC Identified – Evaluate the LPCI 20 PSIG Operability Limit
- ARP 1C03B; Reactor and Containment Cooling and Isolation; Revision 43
- STP 3.5.1-15; RHR System Water Fill Test; Revision 11
- OI 149; Residual Heat Removal System; Revision 155

- CAL-M03-006; Appendix R – RHR & CS Keep Fill Calculation; Revision 1
- CAL-E91-004; Setpoint Calculation for RHR/LPCI Discharge Line Monitoring (Keep Fill) Instrumentation Pressure Switched PS-1955B & 2040B; Revision 1

4OA7 Licensee-Identified Violations

- CR 02172138; Did Not Meet TS 5.1.2

LIST OF ACRONYMS USED

ACP	Administrative Control Procedure
ADAMS	Agencywide Document Access Management System
ALARA	As-Low-As-Is-Reasonably-Achievable
AOP	Abnormal Operating Procedures
ARP	Annunciator Response Procedure
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CE	Condition Evaluation
CFR	<i>Code of Federal Regulations</i>
CR	Condition Report
CRS	Control Room Supervisor
CS	Core Spray
DAEC	Duane Arnold Energy Center
DEP/PI	Drill/Exercise Performance Indicator
EAL	Emergency Action Level
EBD	EAL Bases Document
ECCS	Emergency Core Cooling System
EOF	Emergency Offsite Facility
EPDM	Emergency Planning Department Manual
EPIP	Emergency Plan Implementing Procedures
ERO	Emergency Response Organization
FLEX	Diverse and Flexible Mitigation Capability System
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IP	Inspection Procedure
ISI	Inservice Inspection
LCO	Limiting Condition for Operation
LPCI	Low Pressure Coolant Injection
MSPI	Mitigating Systems Performance Index
NCV	Non-Cited Violation
NDE	Non-Destructive Examination
NEI	Nuclear Energy Institute
NRC	U.S. Nuclear Regulatory Commission
NSTS	National Source Tracking System
OI	Operating Instruction
OSM	Operations Shift Manager
OSP	Outage Safety Plan
OWA	Operator Workaround
PCR	Procedure Change Request
PFP	Pre-Fire Plan
PI	Performance Indicator
psig	Pounds Per Square Inch Gauge
RBCCW HX	Reactor Building Closed Cooling Water Heat Exchanger
RCIC	Reactor Core Isolation Cooling
RFO	Refueling Outage
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RWP	Radiation Work Permit
SBLC	Standby Liquid Control

SDP	Significance Determination Process
SRO	Senior Reactor Operator
SSC	System, Structure, and Component
STP	Surveillance Test Procedure
TCV	Temperature Control Valve
TLCO	Technical Requirement Manual Limiting Condition for Operation
TS	Technical Specification
TSC	Technical Support Center
UFSAR	Updated Final Safety Analysis Report
WO	Work Order

D. Curtland

- 3 -

Letter to Dean Curtland from Karla Stoedter dated February 1, 2017

SUBJECT: DUANE ARNOLD ENERGY CENTER—NRC INTEGRATED INSPECTION
REPORT 05000331/2016004; 05000331/2016501

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