



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

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

May 11, 2011

Mr. Christopher R. Costanzo  
Vice President  
NextEra Energy Duane Arnold, LLC  
3277 DAEC Road  
Palo, IA 52324-9785

**SUBJECT: DUANE ARNOLD ENERGY CENTER INTEGRATED INSPECTION REPORT  
05000331/2011002**

Dear Mr. Costanzo:

On March 31, 2011, the U.S. Nuclear Regulatory Commission (NRC) completed an integrated inspection at your Duane Arnold Energy Center. The enclosed report documents the results of this inspection, which were discussed on April 7, 2011, with you and other members of your staff.

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

Based on the results of this inspection, one NRC-identified finding of very low safety significance and one self-revealed finding of very low safety significance were identified. Each finding involved a violation of an NRC requirement. However, because both findings were of very low safety significance, and because the issues were entered into your corrective action program, the NRC is treating the issues as non-cited violations (NCVs) in accordance with Section 2.3.2 of the NRC Enforcement Policy. Additionally, two licensee-identified violations are listed in Section 4OA7 of this report.

If you contest the subject or severity 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 a copy to the Regional Administrator, U.S. Nuclear Regulatory Commission - Region III, 2443 Warrenville Road, Suite 210, Lisle, IL 60532-4352; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the Resident Inspector Office at the Duane Arnold Energy Center. In addition, if you disagree with the cross-cutting aspects assigned 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.

C. Costanzo

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

Sincerely,

**/RA/**

Kenneth Riemer, Chief  
Branch 2  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000331/2011002  
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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

Report No: 05000331/2011002

Licensee: NextEra Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: Palo, IA

Dates: January 1 through March 31, 2011

Inspectors: L. Haeg, Senior Resident Inspector  
A. Wilson, Senior Resident Inspector, Acting  
R. Murray, Resident Inspector  
M. Mitchell, Health Physicist  
B. Cushman, Resident Inspector, Quad Cities Nuclear  
Power Station

Approved by: Kenneth Riemer, Chief  
Branch 2  
Division of Reactor Projects

Enclosure

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## SUMMARY OF FINDINGS

IR 05000331/2011002; 01/01/2011 – 03/31/2011; Duane Arnold Energy Center; Maintenance Risk Assessments and Emergent Work Control, and Identification and Resolution of Problems.

This report covers a three-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. One Green finding was NRC-identified and one Green finding was self-revealed. The findings were considered non-cited violations (NCVs) of NRC requirements. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

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

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

- Green. A finding of very low safety significance and associated NCV of Technical Specification 5.4, "Procedures," was identified by the inspectors for the licensee's failure to conduct fire watch patrols in accordance with Attachment 7 of Administrative Control Procedure 1412.4, "Impairments to Fire Protection Systems." Specifically, fire watch patrols were not performed for two plant areas on February 18 and 19, 2010, to provide detection for potential fires or fire hazards. The licensee entered the issue into their corrective action program as Condition Report (CR) 344333.

The inspectors determined that the issue was a performance deficiency because it was the result of the failure to meet a requirement and the cause was reasonably within the licensee's ability to foresee and correct and should have been prevented. The inspectors determined that the performance deficiency was more than minor and a finding because it was associated with the Mitigating Systems Cornerstone attribute of Protection against External Factors and 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, Appendix F, "Fire Protection Significance Determination Process," to this finding. Using Part 1 of the Fire Protection SDP Phase 1 Worksheet, the finding was determined to be in the fire prevention and administrative controls category. The degradation rating for this finding was low and, therefore, screened as Green. The inspectors determined that the contributing cause that provided the most insight into the performance deficiency affected the cross-cutting area of Human Performance, having work practices components, and involved aspects associated with the licensee defining and effectively communicating expectations regarding procedural compliance and personnel follow procedures. [H.4(b)] (Section 4OA2)

#### **Cornerstone: Barrier Integrity**

- Green. A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed following restoration of the plant process computer (PPC) from a planned maintenance

activity. Specifically, Integrated Plant Operating Instruction (IPOI) 3, "Power Operations (35% - 100% Rated Power)", Revision 126, did not include adequate criteria to ensure that reactor core thermal power would not exceed the facility's maximum-licensed steady state power level of 1912 megawatts thermal, prior to and during the removal of the PPC from service. The licensee entered the issue into the corrective action program as CR 01611062 and significantly revised IPOI 3 and other applicable instructions and procedures to ensure reactor power was sufficiently reduced and would remain steady with the PPC out-of-service.

The inspectors determined that the issue was a performance deficiency because it was the result of the failure to meet a requirement and the cause was reasonably within the licensee's ability to foresee and correct and should have been prevented. The inspectors determined that the performance deficiency was more than minor and a finding because if left uncorrected the inadequate instruction had the potential to lead to a more significant safety concern. The inspectors applied IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings," to this finding. Because the finding was only associated with the fuel barrier under the Reactor Coolant System (RCS) or Fuel Barrier Column, the finding screened as Green. The inspectors determined that the contributing cause that provided the most insight into the performance deficiency affected the cross-cutting area of Problem Identification and Resolution, having operating experience components, and involved aspects associated with the licensee implementing operating experience through changes to station procedures. [P.2(b)] (Section 1R13)

**B. Licensee-Identified Violations**

Violations of very low safety significance that were identified by the licensee have been reviewed by inspectors. Corrective actions planned or taken 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) operated at full power for the entire assessment period except for brief down-power maneuvers to accomplish rod pattern adjustments and to conduct planned surveillance testing activities.

#### 1. REACTOR SAFETY

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

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

##### .1 Readiness for Impending Adverse Weather Condition – Extreme Cold Conditions

###### a. Inspection Scope

Since extreme cold conditions were forecast in the vicinity of the facility for January 12, 2011, the inspectors reviewed the licensee's overall preparations/protection for the expected weather conditions. On January 13, 2011, the inspectors walked down the Plant Heating Boiler and Reactor Building Ventilation systems because their functions could be affected or required as a result of the extreme cold conditions forecast for the facility. The inspectors observed insulation, heat trace circuits, space heater operation, and weatherized enclosures to ensure functionality of affected systems. The inspectors reviewed licensee procedures and discussed potential compensatory measures with control room personnel. The inspectors focused on plant management's actions for implementing the station's procedures for ensuring adequate personnel for safe plant operation and emergency response would be available. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one readiness for impending adverse weather condition sample as defined in Inspection Procedure (IP) 71111.01-05.

###### b. Findings

No findings were identified.

##### .2 Readiness For Impending Adverse Weather Condition – Heavy Rainfall/External Flooding Conditions

###### a. Inspection Scope

The inspectors evaluated the design, material condition, and procedures for coping with external flooding conditions based on predicted rainfall and rises in river levels. The evaluation included a review to check for deviations from the descriptions provided in the Updated Final Safety Analysis Report (UFSAR) for features intended to mitigate the potential for flooding. As part of this evaluation, the inspectors checked for obstructions that could prevent draining, checked that the roofs did not contain obvious loose items that could clog drains in the event of heavy precipitation, and determined that barriers required to mitigate the flood were in place and operable. Additionally, the inspectors performed a walkdown of the protected area to identify any modification to the

site which would inhibit site drainage during the predicted flood conditions or allow water ingress past a barrier. The inspectors also reviewed the abnormal operating procedure (AOP) and compensatory measures for mitigating flooding conditions to ensure they could be implemented as written. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one readiness for impending adverse weather condition sample as defined in IP 71111.01-05.

b. Findings

No findings were identified.

1R04 Equipment Alignment (71111.04)

.1 Quarterly Partial System Walkdowns

a. Inspection Scope

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

- 'A' Standby Gas Treatment (SBGT) subsystem with 'B' SBGT subsystem out-of-service for Planned Maintenance (PM);
- 'A' and 'B' Standby Diesel Generators (SBDGs) during AOP 903 entry for blizzard warning; and
- Reactor Core Isolation Cooling (RCIC) system with High Pressure Coolant Injection (HPCI) system out-of-service for PM.

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

This inspection constituted three quarterly partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings were identified.

## .2 Semi-Annual Complete System Walkdown

### a. Inspection Scope

On January 18 through 21, 2011, the inspectors performed a complete system alignment inspection of the Emergency Service Water (ESW) system to verify its functionality. 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 line ups, 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 past and outstanding WOs was performed to determine whether any deficiencies significantly affected the system's 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.

This inspection constituted one semi-annual complete system walkdown sample as defined in IP 71111.04-05.

### b. Findings

No findings were identified.

## 1R05 Fire Protection (71111.05)

### .1 Routine Resident Inspector Tours (71111.05Q)

#### a. Inspection Scope

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

- Area Fire Plan (AFP) 08; Standby Gas Treatment System and Motor Generator Set Rooms;
- AFP 1; Torus Area and North Corner Rooms;
- AFP 18; Turbine Building Ground Floor and Tube Pulling Area and AFP 19; Turbine Building Ground Floor [two adjacent areas, one inspection sample];
- AFP 02; Reactor Building South Corner Rooms;
- AFP 23; Battery Rooms 1D-2, 1D-4, 1D-1, Battery Corridor; and AFP 24; Essential Switchgear Rooms 1A-4, 1A-3.

The inspectors reviewed these 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 non-functional 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. 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.

This inspection constituted five routine quarterly fire protection samples as defined in IP 71111.05-05.

b. Findings

No findings were identified.

1R06 Flooding (71111.06)

.1 Internal Flooding

a. Inspection Scope

The inspectors reviewed selected risk important plant design features and licensee procedures intended to protect the plant and its safety-related equipment from internal flooding events. The inspectors reviewed flood analyses and design documents, including the UFSAR, engineering calculations, and abnormal operating procedures to identify licensee commitments. In addition, the inspectors reviewed licensee drawings to identify areas and equipment that may be affected by internal flooding caused by the failure or misalignment of nearby sources of water, such as the fire suppression or the circulating water systems. The inspectors also reviewed the licensee's corrective action documents with respect to past flood related items identified in the corrective action program to verify the adequacy of the corrective actions. Documents reviewed are listed in the Attachment to this report. The inspectors performed a walkdown of the following plant area to assess the adequacy of watertight doors and verify drains and sumps were clear of debris and were operable, and that the licensee complied with its commitments:

- Reactor building internal flooding mitigation strategy.

This inspection constituted one internal flooding sample as defined in IP 71111.06-05.

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On March 7, 14, and 28, 2011, the inspectors observed three separate crews of licensed operators in the plant's simulator during licensed operator requalification examinations to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and that training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- licensed operator performance;
- crew's clarity and formality of communications;
- ability to take timely actions in the conservative direction;
- prioritization, interpretation, and verification of annunciator alarms;
- correct use and implementation of abnormal and emergency procedures;
- control board manipulations;
- oversight and direction from supervisors; and
- ability to identify and implement appropriate TS actions and Emergency Plan actions and notifications.

The crews' 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 sample as defined in IP 71111.11.

b. Findings

No findings were identified.

1R12 Maintenance Effectiveness (71111.12)

.1 Routine Quarterly Evaluations (71111.12Q)

a. Inspection Scope

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

- PPC and Safety Parameter Display System (SPDS); and
- DAEC motor program.

The inspectors reviewed situations where potentially 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/functions classified as (a)(2), or appropriate and adequate goals and corrective actions for systems classified as (a)(1).

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

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

b. Findings

No findings were identified.

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

a. Inspection Scope

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

- Removal of PPC for maintenance;
- Technical Support Center (TSC) ventilation system maintenance;
- Work Week 1101 risk during Low Pressure Coolant Injection system maintenance;
- Failure of 'B' fuel pool exhaust radiation monitor relay during testing; and
- HPCI system re-work, main steam line maintenance, and SBDG surveillance testing.

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 are listed in the Attachment to this report.

This inspection constituted five maintenance risk assessments and emergent work control samples as defined in IP 71111.13-05.

b. Findings

(1) Operating Instruction Did Not Include Adequate Criteria Prior to Removing Plant Process Computer from Service

Introduction: A finding of very low safety significance and associated NCV of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was self-revealed following restoration of the PPC from a planned maintenance activity. Specifically, IPOI 3, "Power Operations (35% - 100% Rated Power)," Revision 126, did not include adequate criteria to ensure that reactor core thermal power would not exceed the facility's maximum-licensed steady state power level [LPL] of 1912 megawatts thermal (MWth), prior to and during the removal of the PPC from service.

Description: At approximately 21:35 hours on January 20, 2011, the licensee placed a reactor water cleanup system demineralizer back into service following planned maintenance activities. Operators in the control room identified that reactor core thermal power began to slowly increase, not unexpectedly, due to the relatively cooler water now flowing into the reactor vessel from the reactor water cleanup system. The Operators immediately reduced reactor power to approximately 1910.8 MWth, by reducing reactor recirculation pump flow, to ensure that the facility's LPL would not be exceeded.

At approximately 22:08 hours the same evening, the Operators removed the PPC from service as part of WO 01383225, to conduct planned maintenance on the PPC. This WO stated, in part, that "prior to computer outage, control room supervisor verify MWth at desired level and plant stable." Prior to shutting down the PPC at 22:08 hours, the Control Room Supervisor believed that reactor core thermal power was stable and that adequate margin existed to the LPL such that it would not be exceeded during the PPC outage. Although the PPC was anticipated to be out-of-service for approximately one hour, ancillary issues arose requiring the PPC to be out-of-service for approximately five hours. During the PPC outage, the Operators used other indications, such as the average power range monitors and main generator power output, to identify any gross changes in power. However, when the PPC was restored to service at approximately 03:25 hours on January 21, 2011, reactor core thermal power indicated approximately 1914 MWth. The operators immediately reduced reactor power by reducing reactor recirculation pump flow to comply with the LPL and entered the issue into the CAP as CR 01611062. Approximately 30 minutes after restoring the PPC, the 2-hour and 8-hour averages for reactor core thermal power started indicating 1912.3 MWth and were lowering.

The inspectors reviewed the circumstances surrounding the event, including work order documents, operating instructions for the plant and PPC, shift operations logs, and the facility's operating license. The inspectors noted that IPOI 3 provided criteria for operation of the plant, including, in part, precautions and limitations to comply with the LPL. Although IPOI 3 provided guidance for complying with the LPL (actions to take if the LPL, or average of the LPL over 2 and 8 hour periods, was exceeded), the instruction did not contain criteria to address:

- The requisite reactor core thermal power prior to taking the PPC out-of-service to ensure that the LPL would not be exceeded during the PPC outage;
- Alternate indications Operators were to monitor for potential changes that could be indicative of an increase in reactor core thermal power when the primary and sole means to do so (the PPC) was not available; and,
- Any compensatory measures the Operators were to take if the PPC was unexpectedly lost or if the planned outage duration was longer than assumed in the work order documents.

The inspectors also noted that the instruction for removing the PPC from service, Operating Instruction (OI) 831.4, "Plant Process Computer System", Revision 71, similarly did not contain adequate criteria addressing those criteria listed above. Following the event, the licensee generated procedure changes to IPOI 3 and OI 831.4 to include the requisite reactor core thermal power level prior to removing the PPC from service and actions to take if the reactor core thermal power level indications from the PPC were unexpectedly lost.

Analysis: The inspectors determined that IPOI 3 did not include adequate criteria to ensure that reactor core thermal power would not exceed the facility's steady-state LPL of 1912 MWth, prior to and during the removal of the PPC from service. The failure to prescribe an instruction of a type appropriate to the circumstances for the activity affecting quality was contrary to 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," and was a performance deficiency. The performance deficiency was determined to be more than minor and a finding because, if left uncorrected, the inadequate instruction had the potential to lead to a more significant safety concern. Specifically, because IPOI 3 did not contain adequate criteria to ensure that the LPL would not be exceeded with the PPC out-of-service, reactor core thermal power could have entered an unanalyzed level potentially affecting the fuel barrier.

The inspectors applied IMC 0609, Attachment 4, "Phase 1 - Initial Screening and Characterization of Findings" to this finding. Because the finding was only associated with the fuel barrier under the RCS or Fuel Barrier Column, the finding screened as Green. The inspectors determined that the contributing cause that provided the most insight into the performance deficiency affected the cross-cutting area of Problem Identification and Resolution, having operating experience components, and involved aspects associated with the licensee implementing operating experience through changes to station procedures. The licensee identified that information contained in Regulatory Information Summary (RIS) 2007-21, "Adherence to Licensed Power Limits," Revision 1, which endorsed Nuclear Energy Institute (NEI) Position Statement for Guidance to Licensees on Complying with the Licensed Power Limit, was not adequately incorporated into station procedures. Specifically, the NEI document provided guidance to ensure that procedures/processes took prudent action prior to pre-planned evolutions that could cause power to exceed the LPL. The licensee reviewed RIS 2007-21 in March 2009 but did not make adequate procedure changes to address appropriate actions prior to removing the PPC from service. This contributing cause was identified by the licensee in CR 01638448 and the inspectors' review concluded it would have been reasonable for the licensee to identify the gap between IPOI 3 and the RIS, providing the most insight into the performance deficiency. [P.2(b)]

Enforcement: Title 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," requires, in part, that activities affecting quality shall be prescribed by documented instructions of a type appropriate to the circumstances. Contrary to this requirement on January 20, 2011, the licensee failed to prescribe an adequate operating instruction appropriate to the circumstances for removing the PPC from service. Specifically, IPOI 3, "Power Operations (35% - 100% Rated Power)," Revision 126, did not include adequate criteria to ensure that reactor core thermal power would not exceed the facility's maximum-licensed steady state power level of 1912 MWth, prior to and during the removal of the PPC from service. Corrective actions included significant revision of IPOI 3 and other applicable instructions and procedures to ensure reactor power was sufficiently reduced and would remain steady with the PPC out-of-service. Because this violation was of very low safety significance, was not repetitive or willful, and was entered into the licensee's CAP as CR 01611062, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy (NCV 05000331/2011002-01, Operating Instruction Did Not Include Adequate Criteria Prior to Removing Plant Process Computer from Service).

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- Past operability evaluation for the 'A' Residual Heat Removal (RHR) drywell spray subsystem following receipt of discharge pressure hi/lo pressure alarm;
- Past operability evaluation for Main Steam Isolation Valve relays failing to energize during functional testing;
- Changes to SBDG fuel oil loading calculation;
- Negative thrust margin on MO-4627 and MO-2238; and
- Control Valve (CV)-1956A and B opening margin concerns.

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 inspection constituted five operability evaluation samples as defined in IP 71111.15-05.

b. Findings

No findings were identified.

1R18 Plant Modifications (71111.18)

.1 Temporary Plant Modifications

a. Inspection Scope

The inspectors reviewed the following temporary modification:

- Temporary Modification 10-025; CV-1065B Pneumatic Override/Differential Pressure Indication/Upstream Pressure Indication and CV-1077B Delta Pressure Indication/Upstream Pressure Indication.

The inspectors compared the temporary configuration changes and associated 10 CFR 50.59 screening and evaluation information 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 systems. The inspectors also compared the licensee's information to operating experience information to ensure that lessons learned from other utilities had been incorporated into the licensee's decision to implement the temporary modification. The inspectors performed field verifications to ensure that the modification was installed as directed; the modification operated as expected; modification testing adequately demonstrated continued system availability and reliability; and that operation of the modification did not impact the operability of any interfacing systems. Lastly, the inspectors discussed the temporary modification with operations and engineering personnel to ensure that the individuals were aware of how extended operation with the temporary modification in place could impact overall plant performance. Documents reviewed are listed in the Attachment to this report.

This inspection constituted one temporary modification sample as defined in IP 71111.18-05.

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- 'B' Residual Heat Removal Service Water operability test following PM;
- Control building ventilation PM testing following corrective maintenance on control room humidifier;
- HPCI system operability test following PM;
- Calibration of turbine stop valves;

- 'B' Core Spray system testing following PM; and
- 'A' Residual Heat Removal Service Water/ESW room cooler testing following PM.

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 TS, the UFSAR, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with post-maintenance tests to determine whether the licensee was identifying problems and entering them in the CAP and that the problems were being corrected commensurate with their importance to safety. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

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

- STP 3.3.5.1-28A; 1A3 4 kilovolt Emergency Bus Sequential Loading Relay Calibration (routine);
- STP 3.3.6.1-05; Main Steam Line Tunnel High Temperature Channel Functional Test (routine);
- STP NS540002B; 'B' Emergency Service Water Operability Test (routine);
- STP 3.4.5-01; Calibration of Equipment Drain Sump and Floor Drain Sump Flow Integrators (RCS); and
- STP 3.8.1-06A; 'A' Standby Diesel Generator Operability Test (Fast Start) (routine).

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

- did preconditioning occur;
- were the effects of the testing adequately addressed by control room personnel or engineers prior to the commencement of the testing;
- were acceptance criteria clearly stated, demonstrated operational readiness, and 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 TS requirements, 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, 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 four routine surveillance testing samples, and one reactor coolant system leak detection inspection sample, as defined in IP 71111.22, Sections -02 and -05.

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 March 29, 2011 to identify any weaknesses or deficiencies in classification, notification,

and protective action recommendation development activities. The inspectors observed emergency response operations in the Control Room Simulator and 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 weaknesses 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 inspection constituted one emergency preparedness drill sample as defined in IP 71114.06-05.

b. Findings

No findings were identified.

**2. RADIATION SAFETY**

**Cornerstone: Occupational Radiation Safety**

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

This inspection constituted one in-plant airborne radioactivity control and mitigation sample as defined in IP 71124.03-05.

.1 Inspection Planning (02.01)

a. Inspection Scope

The inspectors reviewed the UFSAR to identify areas of the plant designed as potential airborne radiation areas and any associated ventilation systems or airborne monitoring instrumentation. Instrumentation review included continuous air monitors (continuous air monitors and particulate-iodine-noble-gas-type instruments) used to identify changing airborne radiological conditions such that actions to prevent an overexposure may be taken. The review included an overview of respiratory protection program and a description of the types of devices used. The inspectors reviewed UFSAR, the TS, and emergency planning documents to identify location and quantity of respiratory protection devices stored for emergency use.

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

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

b. Findings

No findings were identified.

.2 Engineering Controls (02.02)

a. Inspection Scope

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

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

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

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

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

b. Findings

No findings were identified.

.3 Use of Respiratory Protection Devices (02.03)

a. Inspection Scope

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

(protection factor) provided by the respiratory protection devices during use was at least as good as that assumed in the licensee's work controls and dose assessment.

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

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

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

The inspectors selected several individuals assigned to wear a respiratory protection device and observed them donning, doffing, and functionally checking the device as appropriate. Through interviews with these individuals, the inspectors evaluated whether they knew how to safely use the device and how to properly respond to any device malfunction or unusual occurrence (loss of power, loss of air, etc.).

The inspectors chose multiple respiratory protection devices staged and ready for use in the plant or stocked for issuance for use. The inspectors assessed the physical condition of the device components (mask or hood, harnesses, air lines, regulators, air bottles, etc.) and reviewed records of routine inspection for each. The inspectors selected several of the devices and reviewed records of maintenance on the vital components (e.g., pressure regulators, inhalation/exhalation valves, hose couplings). The inspectors assessed whether onsite personnel assigned to repair vital components have received vendor-provided training.

b. Findings

No findings were identified.

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

a. Inspection Scope

Based on the UFSAR, TS, and emergency operating procedure requirements, the inspectors reviewed the status and surveillance records of self-contained breathing apparatuses staged in-plant for use during emergencies. The inspectors reviewed the licensee's capability for refilling and transporting SCBA air bottles to and from the control room and operations support center during emergency conditions.

The inspectors selected several individuals on control room shift crews and from designated departments currently assigned emergency duties (e.g., onsite search and

rescue duties) to assess whether control room operators and other emergency response and radiation protection personnel (assigned in-plant search and rescue duties or as required by emergency operating procedures or the emergency plan) were trained and qualified in the use of SCBA (including personal bottle change-out). The inspectors evaluated whether personnel assigned to refill bottles were trained and qualified for that task.

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

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

b. Findings

No findings were identified.

.5 Problem Identification and Resolution (02.05)

a. Inspection Scope

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

b. Findings

No findings were identified.

2RS4 Occupational Dose Assessment (71124.04)

This inspection constituted one occupational dose assessment sample as defined in IP 71124.04-05.

.1 Inspection Planning (02.01)

a. Inspection Scope

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

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

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

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

b. Findings

No findings were identified.

.2 External Dosimetry (02.02)

a. Inspection Scope

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

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

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

The inspectors assessed the use of active dosimeters (electronic personal dosimeters) to determine if the licensee uses a "correction factor" to address the response of the electronic personal dosimeter as compared to the passive dosimeter for situations when

the electronic personal dosimeter must be used to assign dose and whether the correction factor is based on sound technical principles.

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

b. Findings

No findings were identified.

.3 Internal Dosimetry (02.03)

Routine Bioassay (In Vivo)

a. Inspection Scope

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

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

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

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

b. Findings

No findings were identified.

### Special Bioassay (In Vitro)

a. Inspection Scope

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

The inspectors reviewed the vendor laboratory quality assurance program and assessed whether the laboratory participated in an industry recognized cross-check program including whether out-of-tolerance results were resolved appropriately.

b. Findings

No findings were identified.

### Internal Dose Assessment – Airborne Monitoring

a. Inspection Scope

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

b. Findings

No findings were identified.

### Internal Dose Assessment – Whole Body Count Analyses

a. Inspection Scope

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

b. Findings

No findings were identified.

.4 Special Dosimetric Situations (02.04)

Declared Pregnant Workers

a. Inspection Scope

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

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

b. Findings

No findings were identified.

Dosimeter Placement and Assessment of Effective Dose Equivalent for External Exposures

a. Inspection Scope

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

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

b. Findings

No findings were identified.

Shallow Dose Equivalent

a. Inspection Scope

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

b. Findings

No findings were identified.

## Neutron Dose Assessment

### a. Inspection Scope

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

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

### b. Findings

No findings were identified.

## Assigning Dose of Record

### a. Inspection Scope

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

### b. Findings

No findings were identified.

## .5 Problem Identification and Resolution (02.05)

### a. Inspection Scope

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

### b. Findings

No findings were identified.

#### 4. OTHER ACTIVITIES

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

#### 4OA1 Performance Indicator Verification (71151)

##### .1 Unplanned Scrams per 7000 Critical Hours

###### a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams per 7000 Critical Hours performance indicator (PI) for the period from the first quarter 2010 through the fourth quarter 2010. To determine the accuracy of the PI data reported during this period, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports, and NRC Inspection Reports for the period of January 2010 through December 2010 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 unplanned scrams per 7000 critical hours sample as defined in IP 71151-05.

###### b. Findings

No findings were identified.

##### .2 Unplanned Scrams with Complications

###### a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Scrams with Complications performance indicator for the period from the first quarter 2010 through the fourth quarter 2010. To determine the accuracy of the PI data reported during this period, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports and NRC Integrated Inspection Reports for the period of January 2010 through December 2010 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 unplanned scrams with complications sample as defined in IP 71151-05.

b. Findings

No findings were identified.

.3 Unplanned Transients per 7000 Critical Hours

a. Inspection Scope

The inspectors sampled licensee submittals for the Unplanned Transients per 7000 Critical Hours performance indicator for the period from the first quarter 2010 through the fourth quarter 2010. To determine the accuracy of the PI data reported during this period, PI definitions and guidance contained in the NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, were used. The inspectors reviewed the licensee's operator narrative logs, issue reports, maintenance rule records, event reports and NRC Integrated Inspection Reports for the period of January 2010 through December 2010 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 unplanned transients per 7000 critical hours sample as defined in IP 71151-05.

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

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

a. Inspection Scope

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

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

b. Findings

No findings were identified.

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

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

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

b. Findings

No findings were identified.

.3 Selected Issue Follow-Up Inspection: Refueling Outage 22 Lessons Learned

a. Inspection Scope

During a review of items entered in the licensee's CAP, the inspectors recognized corrective action items documenting lessons-learned from the fall 2010 Refueling Outage 22. The inspectors reviewed condition reports associated with self-assessments performed by the licensee from November 23, 2010, through December 8, 2010, to evaluate if there were any new conditions adverse to quality, review the evaluations associated with the conditions, and identify any corrective actions taken or planned.

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

b. Findings

No findings were identified.

.4 Selected Issue Follow-Up Inspection: Apparent Cause Evaluation for Missed Fire Watches

a. Inspection Scope

The inspectors reviewed the licensee's apparent cause evaluation associated with fire watch patrols that were either not conducted or inadequately conducted in February, 2010.

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

b. Findings

(1) Failure to Perform Adequate Fire Patrols in Areas Containing Safety-Related Equipment

Introduction: A finding of very low safety significance and associated NCV of Technical Specification 5.4, "Procedures," was identified by the inspectors for the licensee's failure to conduct fire patrols in accordance with Attachment 7 of Administrative Control Procedure (ACP) 1412.4, "Impairments to Fire Protection Systems."

Description: Fire Protection Impairment Request (FPIR) FPR-09-7320 required hourly fire patrols of several plant areas, including the Northwest Corner Room (NWCR) basement. Plant Procedure, ACP 1412.4, Revision 57, stated administrative controls for establishing and documenting fire patrols, when required for fire protection impairments. Specifically, Attachment 7, "Fire Patrol Responsibilities," stated, in part, that fire patrols are responsible for "observing the specified location at the specified time (e.g. continuously, hourly, shiftly) for the purposes of detecting and reporting any fires or fire hazards." Additionally, Attachment 7 stated that fire patrols are responsible for "immediately reporting to the Control Room any conditions likely to cause a fire or affect the severity of a fire, such as leaks, spills, accumulation of combustibles, equipment storage, or faulty equipment."

As part of a quarterly fire protection inspection sample, the inspectors reviewed the station's compensatory fire patrols. To verify that the patrols were being performed at the specified frequency, the inspectors reviewed the security key card entry records for rooms requiring fire patrols, along with the Hourly Firewatch Surveillance Checklists that documented the completion of the hourly fire patrols required by FPIR FPR-09-7320 for Fire Zones 01AN (Reactor Building-Torus North), 01B (Reactor Building-Northwest Corner Room (NWCR)), and 02D (Reactor Building-RHR Valve Room). Document FPIR FPR-09-7320 specified the areas to be patrolled, including the torus room from the top of the ladder on the catwalk to the basement of the NWCR. The impairment was initiated to address multiple spurious operation (MSO) vulnerabilities, which had been identified as part of the licensee's transition to National Fire Protection Association (NFPA) 805, "Performance-Based Standard for Fire Protection for Light Water Reactor Electric Generating Plants," pursuant to 10 CFR 50.48(c). As such, the inspectors determined that the impairment was necessary due to a lack of adequate fire barriers (a fire protection system) for cables important to safety. The inspectors reviewed records for February 18 through February 21, 2010.

While reviewing security key card entry records for the NWCR, the inspectors identified multiple instances of fire patrol personnel entering and then exiting the room within a short time frame. The shortest time frame recorded was 4 seconds, with multiple instances of entries and exits occurring in a time frame of less than 20 seconds. The layout of the NWCR is such that personnel enter the room at the upper most level and then must descend several flights of stairs in order to reach the base floor of the room. Additionally, the layout of the room precludes personnel from viewing the entire floor of the room from any of the mezzanine levels. When the inspectors timed themselves, it took 31 seconds to walk from the floor of the NWCR to the top of the stairs where the exit card reader and door are located. The inspectors questioned the

licensee as to the adequacy of the fire patrols relative to the requirements of ACP 1412.4, FPR-09-7320, and the security key card reader data which all indicated that fire patrols were routinely entering and then exiting the rooms in a very short time period. The licensee initiated CAP 073385 to document the potential inadequacies associated with fire patrols performed as part of FPR-09-7320.

The inspectors also identified an instance where the Hourly Firewatch Surveillance Checklist had been initialed as complete for both the RHR valve room and NWCR; however, there were no corresponding security key card entry records for those two rooms during the specific hour of 0300 on February 18, 2010. Plant Procedure ACP 1412.4 defined an Hourly Fire Patrol as an hourly check of a designated area once during each 60 minute segment, beginning at the top of each hour. Security personnel performed an extent-of-condition review by reviewing key card reader data for other plant areas that required fire patrols. During the review, security personnel identified another instance where a fire patrol was documented as completed but there were no corresponding key card entry records for entry into the areas. The licensee initiated CAP 068465, "NCAQ – NFPA-805 Project MSO Vulnerabilities for Fire Area CB-2," on July 16, 2010, and FPIR FPR-09-7318, to address MSO vulnerabilities in fire area CB-2 (Control Building 1A4, west essential switchgear room) to require an hourly fire patrol of the room. The licensee also initiated CAP 068466, "NCAQ – NFPA-805 Project MSO Vulnerabilities for Fire Area CB-3," on July 16, 2009, and FPIR FPR-09-7319, to address MSO vulnerabilities in fire area CB-3 (Control Building 1A3, east essential switchgear room) to require an hourly fire patrol of the room. The licensee's extent-of-condition review identified that on February 19, 2010, the designated fire patrol individual initialed the Hourly Firewatch Surveillance Checklist as being completed for the 1A3 and 1A4 essential switchgear rooms fire patrols during the 2000 hour. However, there was no corresponding key card reader data, which indicated that the individual had entered the two rooms for the 2000 hour.

The licensee had initiated FPIRs FPR-09-7320, FPR-09-7318, and FPR-09-7319 to address MSO vulnerabilities documented by CAP 068476, CAP 068465, and CAP 068466 for fire areas RB-1, CB-2, and CB-3. Although CAP 068476, CAP 068465, and CAP 068466 stated the vulnerabilities were beyond those required to be analyzed as part of their fire protection program because the vulnerabilities involved more than a single hot short, the inspectors noted that 10 CFR Part 50, Appendix R, Section III.G.2, requires consideration of hot shorts, open circuits, and shorts to ground, with no limitation on the number of hot shorts involved. As such, the inspectors determined that the fire patrols specified by FPIRs FPR-09-7320, FPR-09-7318, and FPR-09-7319 were required to address the lack of fire barriers or other means of protection required by 10 CFR Part 50, Appendix R, Section III.G.2.

Analysis: The inspectors determined that fire patrols were not performed for two fire areas on February 18, 2010, and February 19, 2010, and thus prevented the fire patrols from observing and detecting potential fires or fire hazards. This failure to perform fire patrols was contrary to ACP 1412.4 and was a performance deficiency.

The finding was determined to be more than minor and a finding because it was associated with the Mitigating Systems Cornerstone attribute of Protection Against External Factors and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, not performing fire patrols in accordance with

ACP 1412.4 could have led to fire patrols not observing or detecting potential fires or fire hazards in safety-related plant areas.

In accordance with IMC 0609, "Significance Determination Process," Attachment 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," Table 3b, the inspectors determined that the finding degraded the fire protection defense-in-depth strategies. Therefore, screening under IMC 0609, Appendix F, "Fire Protection Significance Determination Process," was required. Using Part 1 of the Fire Protection SDP Phase 1 Worksheet in IMC 0609, Significance Determination Process (SDP), the performance deficiency was determined to be in the fire prevention and administrative controls category, based on the fire patrols being inadequate. The degradation rating for this finding was low and, therefore, screened as very low safety significance (Green).

The inspectors determined that the contributing cause that provided the most insight into the performance deficiency affected the cross-cutting area of Human Performance, having work practices components, and involved aspects associated with the licensee defining and effectively communicating expectations regarding procedural compliance and personnel follow procedures. Specifically, the inadequate performance of fire patrols was the result of the personnel performing the fire watch not having a complete understanding of fire patrol responsibilities. [H.4(b)]

Enforcement: Technical Specification 5.4, "Procedures," states, in part, that, "written procedures shall be established, implemented, and maintained covering the following activities: d. Fire Protection Program implementation." The Fire Plan Program describes implementation of the Fire Protection Program. The Fire Plan Program, Volume 1, section 6.3(1), states, "ACP 1412.4 places administrative controls over impairments to fire protection systems." Section 3.1(1) of ACP 1412.4 requires that compensatory measures be established for impairments to fire protection systems. Document FPIR FPR-09-7320 specified hourly fire patrols for Fire Zones 01AN, 01B, and 02D; FPR-09-7318 specified hourly fire patrols of Fire Zone 10E; and FPR-09-7319 specified hourly fire patrols for Fire Zone 10F; all of which were considered compensatory measures for fire protection systems. Section 2.0 of ACP 1412.4 defined an Hourly Fire Patrol as an hourly check of a designated area once during each 60 minute segment, beginning at the top of each hour.

Contrary to the above, for the time period 0300 through 0400 on February 18, 2010, and 2000 to 2100 on February 19, 2010, hourly fire watches were not performed as required by written procedures for the Fire Protection Program for Fire Zones 01B (NWCR) and 02D (RHR Valve Room), and Fire Zones 10E (1A4 essential switchgear room) and 10F (1A3 essential switchgear room), as required by FPIRs FPR-09-7320, FPR 09-7318, and FPR-09-7319. Specifically, the only way to gain access to Fire Zones 01B and 02D was through a door requiring a key card for access. There was no record of key card entry for either Fire Zone 01B or 02D for the time period 0300 through 0400 on February 18, 2010. Additionally, the only way to gain access to Fire Zones 10E and 10F was through a door requiring a key card for access. There was no record of key card entry for either Fire Zone 10E or 10F for the time period 2000 through 2100 on February 19, 2010. The licensee is in transition to NFPA 805 and, therefore, the NRC-identified violation was evaluated in accordance with the criteria established by Section A of the NRC's Interim Enforcement Policy Regarding Enforcement Discretion for Certain Fire Protection Issues (10 CFR Part 50.48) for a licensee in

NFPA 805 transition. The inspectors determined that for this violation the licensee had not established adequate compensatory measures. As a result, the inspectors concluded that the violation did not meet all four criteria established by Section A and discretion associated with NFPA 805 transition was not granted. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program as CR 344333, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy (NCV 05000331/2011002-02, Failure to Perform Adequate Fire Patrols in Areas Containing Safety-Related Equipment).

40A3 Follow-Up of Events and Notices of Enforcement Discretion (71153)

.1 'A' Moisture Separator Drain Tank (MSDT) Dump Valve Fully Opens Unexpectedly

a. Inspection Scope

The inspectors reviewed the plant's response to the unexpected full opening of the 'A' MSDT dump valve. On January 19, 2011, control room operators received a low level alarm for the 'A' MSDT and identified that the dump valve was indicating full open (normally full closed). Operators entered abnormal operating procedures to mitigate the impact on the reactor plant due to the anticipated change in feedwater heating and reactivity. Per the AOPs, operators reduced reactor power via reactor recirculation system flow adjustment, and took manual control of the 'A' MSDT dump valve and closed the valve. The inspectors reviewed the control room operators' response to the event, follow-up troubleshooting (identified a faulty level transmitter) and implementation of the operational decision making issue process, and reviewed corrective actions to install a temporary modification to allow restoring 'A' MSDT automatic level control. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report (LER) 05000331/2010-005-00: Momentary Loss of Shutdown Cooling During Refueling Outage

a. Inspection Scope

On November 10, 2010, with the plant shutdown in Mode 5 for a refueling outage and the 'A' RHR pump in service for shutdown cooling, Operators were in the process of restoring power to the outboard shutdown cooling isolation valve (MO-1909) following a pre-planned 'B' RPS power supply transfer. Due to a procedure error, control power to MO-1909 was not isolated during the 'B' RPS power supply transfer resulting in automatic closure of the valve. Because MO-1909 served as a common isolation valve for both 'A' and 'B' RHR systems, the primary means of decay heat removal was lost for approximately 30 minutes until the 'C' RHR pump was placed in service. The inspectors verified that no new or additional issues of concern were identified with respect to the Green self-revealed finding and NCV of Technical Specification 5.4.1 documented in NRC Inspection Report 05000331/2010-005 associated with the procedural deficiency. Documents reviewed are listed in the Attachment to this report. This LER is closed.

This inspection constituted one event report review sample as defined in IP 71153-05.

b. Findings

No findings were identified.

.3 (Closed) Licensee Event Report (LER) 05000331/2010-006: Standby Liquid Control Test Tank Seismic Analysis

a. Inspection Scope

On November 10, 2010, the licensee completed an engineering analysis that concluded the Standby Liquid Control (SBLC) system test tank may not withstand a design basis earthquake (DBE) when filled greater than three-fourths full of water. The inspectors reviewed immediate corrective actions taken by the licensee, the engineering analysis, causal information, and procedure changes to ensure that the test tank would be drained prior to restoring SBLC system operability. A licensee-identified violation is documented in section 4OA7. Documents reviewed are listed in the Attachment to this report. This LER is closed.

This inspection constituted one event report review sample as defined in IP 71153-05.

b. Findings

No findings were identified.

4OA6 Management Meetings

.1 Exit Meeting Summary

On April 7, 2011, the inspectors presented the inspection results to Mr. C. Costanzo, Site Vice President, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

.2 Interim Exit Meetings

Interim exits were conducted for:

- In-Plant Airborne Radioactivity Control and Mitigation and Occupational dose Assessment with Mr. C. Costanzo, Site Vice President, on January 28, 2011.

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) were identified by the licensee and are violations of NRC requirements which meet the criteria of the NRC Enforcement Policy for being dispositioned as NCVs:

- The licensee identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," for the failure to ensure the seismic qualification of the SBLC system test tank. Specifically, the licensee completed engineering analyses that concluded the SBLC test tank may not withstand a DBE when filled greater than three-fourths full of water. This condition had the potential to cause the failure of other safety-related SBLC equipment, rendering the system inoperable. Immediate corrective actions included draining the test tank. The licensee also revised applicable procedures to ensure that the test tank was drained prior to restoring SBLC system operability following maintenance or surveillance activities. The licensee documented the issue and associated corrective actions in CR 0594231.

The failure to ensure the seismic qualification of the SBLC system test tank during a DBE was a performance deficiency. The performance deficiency was more than minor since it was similar to IMC 0612, Appendix E, Example 3j. The seismic qualification deficiencies were significant enough to require compensatory measures and procedural changes to ensure seismic qualification of the SBLC system test tank. The inspectors determined the finding could be evaluated using the SDP in accordance with IMC 0609, "Significance Determination Process," and affected the Mitigating Systems Cornerstone. According to IMC 0609, Attachment 0609.04, Table 4a, the finding screened as potentially risk significant due to a postulated seismic event and the Region III Senior Risk Analyst (SRA) performed an SDP Phase 3 risk-assessment of the performance deficiency.

The Duane Arnold SBLC system is used as a backup for reactivity control and thus the SRA evaluated the risk impact for failure to scram (anticipated transient without scram) events. The Phase 3 analysis assumed that, given a seismic-induced functional failure of the SBLC system and the control rod drive and hydraulic units, the core damage probability was 1.0. The SRA used generic seismic fragility information and plant-specific seismic hazard information from the Risk-Assessment Standardization Project (RASP) Handbook. Using Table 4A-1 from the RASP Handbook, the frequency of various seismic events was determined. Using this information and assuming a conditional core damage probability of 1.0, the seismic core damage frequency for this issue was below  $1E-6$ . The SRA also reviewed the licensee's risk evaluation, which reached the same conclusion. This result showed that the change in core damage frequency for this issue was of very low safety significance (Green).

- The licensee identified a finding of very low safety significance (Green) and an associated NCV of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings", for the failure to provide adequate instructions for venting air from the HPCI system. Specifically, on February 23, 2011, following maintenance on the HPCI system and subsequent operability test run, the licensee failed to adequately vent an instrument line. This led to the licensee declaring HPCI inoperable due to indications of air in the instrument line on February 26, 2011. The licensee wrote CR 1624116 to document the issue. Immediate corrective actions included thoroughly venting the system and performing surveillance testing to demonstrate system operability.

The failure to have adequate instructions for venting the HPCI system was a performance deficiency. The performance deficiency was more than minor because it affected 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. Evaluating the finding using the SDP in accordance with IMC 0609, "Significance Determination Process," it screened as having very low safety significance (Green) using Table 4a of IMC 0609 because all questions under the Mitigating Systems Cornerstone column were answered "No."

ATTACHMENT: SUPPLEMENTAL INFORMATION

## **SUPPLEMENTAL INFORMATION**

### **KEY POINTS OF CONTACT**

#### Licensee

C. Costanzo, Site Vice President  
D. Curtland, Plant General Manager  
K. Kleinheinz, Site Engineering Director  
S. Catron, Licensing Manager  
G. Young, Nuclear Oversight Manager  
G. Pry, Operations Director  
R. Wheaton, Maintenance Site Director  
R. Porter, Chemistry & Radiation Protection Manager  
B. Kindred, Security Manager  
B. Simmons, Training Manager  
M. Davis, Emergency Preparedness Manager  
J. Kalamaja, Assistant Operations Manager  
J. Karrick, General Supervisor Radiation Protection  
M. Heermann, Radwaste Shipper  
B. Murrell, Licensing Engineer Analyst  
R. Schlueter, Health Physics Foreman ALARA Coordinator  
W. Render, Instructor, DAEC Operator Training

#### Nuclear Regulatory Commission

K. Feintuch, Project Manager, NRR  
K. Riemer, Chief, Reactor Projects Branch 2

## LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

### Opened

05000331/2011002-01	NCV	Operating Instruction did not Include Adequate Criteria Prior to Removing Plant Process Computer from Service (Section 1R13)
05000331/2011002-02	NCV	Failure to Perform Adequate Fire Patrols in Areas Containing Safety-Related Equipment (Section 4OA2.4)

### Closed

05000331/2011002-01	NCV	Operating Instruction did not Include Adequate Criteria Prior to Removing Plant Process Computer from Service (Section 1R13)
05000331/2011002-02	NCV	Failure to Perform Adequate Fire Patrols in Areas Containing Safety-Related Equipment (Section 4OA2.4)
05000331/2010-005-00	LER	Momentary Loss of Shutdown Cooling During Refueling Outage (Section 4OA3.2)
05000331/2010-006-00	LER	Standby Liquid Control Test Tank Seismic Analysis (Section 4OA3.3)

### 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.

### Section 1R01

AOP 903; Severe Weather; Revision 30  
CR 01608338; 1C23A (E-2) Reactor Building Supply Air Plenum Low Temperature  
CR 01608645; Operating Crews Not Entering AOP 903 When Less Than 0 Degrees Fahrenheit  
AOP 902; Flood; Revision 35  
CR 01630339; UFSAR Maximum Flood of Record Out of Date  
CR 01632119; Discrepancy Found in AOP 902

### Section 1R04

OI 454A1; ESW System Electrical Lineup; Revision 5  
OI 454A2; 'A' ESW System Valve Lineup and Checklist; Revision 11  
OI 454A4; 'B' ESW System Valve Lineup and Checklist; Revision 12  
OI 454A6; ESW System Control Panel Lineup; Revision 2  
CR 01610533; NRC Identified Housekeeping: Pipe Clamps Adrift in HPCI Room  
OI 324A10; SBDG Standby/Readiness Condition Checklist; Revision 13  
OI 150A2; RCIC System Valve Lineup and Checklist; Revision 12  
OI 150A1; RCIC System Electrical Lineup; Revision 2  
OI 150A4; RCIC System Control Panel Lineup; Revision 3

### Section 1R05

ACP 1203.53; Fire Protection; Revision 14  
ACP 1412.4; Impairments to Fire Protection Systems; Revision 61  
AFP 08; Standby Gas Treatment System and Motor Generator Set Rooms, El. 786'-0";  
Revision 25  
DAEC Fire Plan – Volume 1, Program; Revision 58  
AFP 01; Torus Area and North Corner Rooms, El. 716'-9" and 735'-7.5", Revision 25  
AFP 02; Reactor Building South Corner Rooms, El. 716'-4" thru 747'-11 ¾"; Revision 23  
AFP 18; Turbine Building Ground Floor and Tube Pulling Area; Revision 28  
AFP 19; Turbine Building Ground Floor; Revision 25  
CR 01616129; Oil Leak Catch Containers Should Be Changed  
AFP 23; Battery Rooms 1D-2, 1D-4, 1D-1, Battery Corridor, El. 757'-6"; Revision 25  
AFP 24; Essential Switchgear Rooms 1A-4, 1A-3; Revision 29

### Section 1R06

Probabilistic Evaluation of Internal Flooding for Duane Arnold Energy Center 1249309D-010;  
dated January 1995  
Performance Criteria Basis Document; Reactor Building Sump System; Revision 2

## Section 1R12

Scoping and Risk Significance Form; SUS 31.01, Plant Process Computer; dated February 9, 1994  
Scoping and Risk Significance Form; SUS 31.02, Safety Parameter Display System; dated February 9, 1994  
March 12 and March 20, 1997 Expert Panel Meeting Minutes; Attachment 1 to NG-97-0706  
Emergency Operating Procedure Section 11; Graphs; Revision 5  
CR 01606604; Complete Implementation of EOP3 and ARMS PPC Screens For EALs  
CR 01603824; P1 Check Unavailable  
CR 01603828; PPC Calculation Of Thermal Power & Load Line  
CR 01603558; Failure of DAC-VUH-40 Caused Hi Temp In Computer Room  
CR 01603626; DAC-VUH041 Is Running At Only 50% Capacity  
CR 0588773; Unexpected Computer Point Alarm From SPDS036  
CR 0392782; 1C402, SPDS Interface Panel, Gains Are Alarming  
CR 0345334; 074386 CAQ – 10DR – PPC Failure Scenario  
CR 0344744; 073796 NCAQ – RCE1088 Data Review Identified Inadequate Corrective Action  
DAEC Maintenance Rule Program, Module 0, Overview; Revision 3  
DAEC Maintenance Rule Program, Module 1, Scoping; Revision 2  
ACP 1208.9; DAEC Motor Program; Revision 4  
CR 01616334; New CR Not Initiated When New Condition Identified During Apparent Cause Evaluation  
ER-AA-108; Motor Program Engineering Guide; Revision 0  
DAEC Motor Program Health Report; 2<sup>nd</sup>-4<sup>th</sup> Quarters 2010  
CR 01605069; 1P022B-M Failed PI Test Ratio  
CR 0582166; HPCI Room Cooling Unit 1V-AC-14B  
CR 01616674; Low Voltage, Crit. 1 Motors – PM Requirements and Frequency

## Section 1R13

OP-AA-102-1003; Guarded Equipment (DAEC Site Specific Information); Revision 8  
Work Planning Guide-1; Work Process Guidelines; Revision 42  
Work Planning Guide-2; On-Line Risk Management Guideline; Revision 56  
WM-AA-1000; Work Activity Risk Management; Revision 6  
OP-AA-104-1007; Online Aggregate Risk; Revision 1  
CR 01611062; Indicated Core Thermal Power on the Plant Process Computer  
CR 01621572; IPOI 3 Does Not Agree with Guidance on Average Thermal Power  
CR 01638448; OE Review and Incorporation of RIS/NEI Guidance in IPOI 3  
IPOI 3; Power Operations (35%-100% Rated Power); Revision 126  
WO 1383255; Remove the Plant Process Computer  
OI 261; Reactor Water Cleanup System; Revision 82  
CR 01608989; Clarity Needed for EP Issue Reportability  
CR 01608799; V33-0212 Inadvertently Bumped Open While Applying Tags Plus  
CR 01608863; TSC Standby Filter Unit Charcoal Found Wet  
OI 7929.1; Administration Building Heating Ventilation and Air Conditioning (HVAC) System; Revision 18  
NS290201; TSC Standby Filter Unit HEPA and Charcoal Testing; Revision 4  
CR 01616771; Group 3 Isolation Occurred STP 3.3.6.1-21  
CR 01616845; Position Switch for CV-4378B is Misaligned and Indicates Closed  
STP 3.3.6.1-21; Refuel Floor Exhaust Duct Radiation Monitor Channel Calibration; Revision 11  
CR 01623055; MSL Low Pressure STP Conflicts with Group 2 and 4 STP

STP 3.3.6.1-02; Main Steam Line Low Pressure Instrument Channel Calibration; Revision 9  
STP 3.5.1-05; HPCI System Operability Test; Revision 52  
Work Week 1101 Preview

#### Section 1R15

CR 01602508; RHR Low Pressure Alarm During STP  
CR 01602604; RHR Low Pressure ARP Limiting Condition for Operation Entry Criteria  
CR 01610444; Vulnerability to RHR Gas Intrusion  
STP 3.5.1-15; RHR System Water Fill Test; Revision 1  
CR 01608747; 2011 CDBI SAQH 586065 – Observation  
CAL-M91-014; Standby Diesel Generator 7 Day Fuel Oil Requirement; Revision 4  
CAL-E01-003; Single Standby Diesel Generator Static Loading for a Loss of Coolant Accident;  
Revision 3  
CE 6100; CDBI Assessment – Emergency Diesel Generator Loading and Maximum Fuel  
Consumption  
CR 01623559; Negative Thrust Margin on MO-4627 and MO-2238  
CR 01599805; CV 1956A Failed To Open When ‘A’ ESW Was Started  
CR 01627874; Improper Mean Seat Diameter Used in CV 1956A/B Capability Calculation  
CR 01633246; Provided Additional Information to CA 1599805-11

#### Section 1R18

TM10-025; EC 270520; CV1065B Pneumatic Override/Differential Pressure  
Indication/Upstream Pressure Indication and CV1077B Delta Pressure Indication/Upstream  
Pressure Indication; Revision 0

#### Section 1R19

NS160002B; ‘B’ RHR Service Water Operability Test; Revision 2  
WO 01287958; V46-0183 Extremely Hard to Operate  
WO 01283478; 1B4429 Inspect Breaker & Motor Control Unit  
WO 01286697; MO1940 Diagnostic Test  
WO 01281898; V13-0004, RHRSW HX Bypass Valve Internal Inspection  
CR 01609036; HS6126 Found in OFF Position  
OI 730A6; Control Building HVAC System Control Panel Lineup; Revision 9  
OI 730; Control Building HVAC System; Revision 109  
WO 40046033; HS 6126 Handswitch Feels Broken 1VS031 Not Running  
STP 3.5.1-05; HPCI System Operability Test; Revision 51  
CR 01623000; FI2309 Reading Approx 400 GPM Following STP 3.5.1-05  
CR0 1624131; Component Positioning During Clearance  
CR 01624116; HPCI Flow Indication Reads 550 GPM in Standby Condition  
CR 01624223; Indication of Air While Venting HPCI Test Return Line  
CAL-M01-271; HPCI, FIC-2309 and RCIC FIC-2509 Indicated Flow Vs. Actual Flow  
CAP 12364; Revision of OI 150 Precaution 26 Concerning Flow Indication (FIC2309)  
CR 01600268; SV2 While Working on a SV a Rx Pressure Increase Occurred  
STP 3.3.1.1-20; Calibration of Turbine Stop Valve Position Switches; Revision 8  
OI 151; Core Spray System; Revision 61  
STP 3.5.1-01B; ‘B’ Core Spray System Operability Test; Revision 5

## Section 1R22

STP 3.3.5.1-28A; 1A3 4kV Emergency Bus Sequential Loading Relay Calibration; Revision 1  
STP 3.3.6.1-05; Main Steam Line Tunnel High Temperature Channel Functional Test;  
Revision 7  
STP 3.4.5-01; Calibration of Equipment Drain Sump and Floor Drain Sump Flow Integrators;  
Revision 10  
CR 01615991; Documentation Error Discovered on STP 3.4.5-01  
CR 01619280; Increase Drywell Equipment Drain Sump Leakage  
STP NS540002B; 'B' Emergency Service Water Operability Test; Revision 12  
CR 01616803; Manual Throttle Valve Vibrates Open  
CR 01616814; Made Flow Adjustments to 'B' ESW During NS540002B  
CR 01619054; V13-0046 Tie Wrapped to Ensure No Valve Movement  
CR 01619084; Is the Restraint For V13-46 a Compensatory Action?  
CR 01619337; Vibration Causing the Valve to Open  
CR 01619402; CR 01616803 Identified Incorrect Throttle Valve  
STP 3.8.1-06A; 'A' Standby Diesel Generator Operability Test (Fast Start); Revision 10  
OI 324 Attachment 9; SBDG Operating Checklist; Revision 11

## Section 2RS3

06-004-A; Evaluation of Portal Monitor Performance to Detect Internal Contamination, at the  
Duane Arnold Energy Center; December, 2006  
08-001-R; Radiological Engineering Calculation-10 CFR Part 61 Compliance Date Technical  
Basis for Duane Arnold Energy Center Reactor Water Clean-Up Resin; May 1, 2008  
CR 00344277; Failure to Document SCBA Inspections  
CR 00345517; SCBA Harness Fell Apart  
CR 00575416; SCBA Compressor is Past Due for Preventative Maintenance  
CR 00581602; Two SCBA Failed to Work  
HPP 3106.03; Description and Issuance of Respiratory Protection Equipment; Revision 10  
HPP 3106.04; Inspection, Maintenance and Quality Assurance of Respiratory Protection  
Equipment; Revision 18  
HPP 3106.05; Breathing Air Quality Assurance Test; Revision 17  
HPP 3104.03; Radiological Air Sample Collection and Analysis; Revision 16  
HPP 3104.08; Shift Routine Air Samples; Revision 25  
HPP 3104.16; Area Classification For Alpha Emitting Radionuclides; Revision 0  
HPP 3106.07; Control of Portable Ventilation Units and Vent Hood Testing; Revision 29  
HPP 3106.09; Issue and Control of Radiologically Controlled Area High Efficiency Particulate Air  
Vacuum Cleaners; Revision 0  
HPP3109.48; Operation of Gilian Gil-Air (Lapel) Air Sampler; Revision 7  
HPP3109.49; Operation of Eberline AMS-4; Revision 6  
HPP3109.71; Operation of the Fastscan Whole Body Counting System; Revision 15  
HPP 3110.49; Calibration of Eberline AMS-4; Revision 3  
PCP 1.1; Laboratory Safety and Chemical Hygiene Plan; Revision 11  
PDA-09-005; Duane Arnold Energy Center Nuclear Assurance Report: Radiation Protection;  
April 20, 2009  
PDA 10-008; Duane Arnold Energy Center Nuclear Assurance Report: Radiation Protection;  
June 28, 2010  
STP 3.6.4.3-03A; SBGT System High Efficiency Particulate Air and Charcoal Filter Efficiency  
Tests; Revision 22  
STP 3.7.4-02; Main Control Room Ventilation Standby Filter Unit Test, Revision 14

Grade D Air Analysis Test Results; April 24, 2007 to September 24, 2010  
RWH 3403.4; Waste Segregation and Handling; Revision 13  
Total Effective Dose Equivalent As-Low-As-Reasonably-Achievable Assessment for RWP  
10-3010; November 22, 2010

#### Section 2RS4

ACP 1411.17; Occupational Dose Limits and Upgrades; Revision 22  
ACP 1411.18; Personnel Dosimetry; Revision 33  
CR161482; NRC Observations Made During Radiation Protection Inspection  
CR 00394096; Employee Received a Dose Rate Alarm and Failed to Report It  
CR 00526901; Perform In-field Evaluation to Determine Electronic Dosimeter Bias  
CR 00584659; Consider Hearing Tests for Electronic Dosimeters  
CR 00595035; Worker Unable to Clear Portal Monitor at Security Building  
HP-55IN; Radiological Work Screening Form Internal Exposure Control; Revision 4  
HPP3105.01 Dosimetry Issuance and Record Keeping; Revision 24  
HPP3105.04; Estimating Effective Dose Equivalent From External Radiation Sources Using  
Two Dosimeters; Revision 3  
HPP3105.03; Shallow Dose Equivalent Assessment; Revision 11  
HPP3105.05; Administration of In-Vivo and In-Vitro Bioassay; Revision 17  
HPP3105.06; Committed Effective Dose Equivalent Determination from DAC-Hours; Revision 4  
HPP3105.08; Personnel Dosimetry Verification Program; Revision 15  
HPP3105.09; Personnel Dosimetry for External Exposure; Revision 26  
HPP3110.37; Gamma 60 Calibration; September 3, 2010  
HPP3110.37; Gamma 60 Calibration; October 27, 2010  
HPP3110.37; Gamma 60 Calibration; November 27, 2010  
RP-AA-104-1000; Total Effective Dose Equivalent As-Low-As-Reasonably-Achievable  
Evaluation; Revision 1  
RP-AA-101-2004; Method for Monitoring and Assigning Effective Dose Equivalent for High Dose  
Gradient Work; Revision 0  
Annual Calibration RTM950; March 6, 2010  
Dosimeter Calibration Records; October 22, 2010  
Trash Segregation Hood Ventilation Flow Test; September 13, 2010  
Negative Pressure Respirator Issue Log; November, 2010  
Lapel Air Sampler Tracking Log; November, 2010

#### Section 1EP6

Controller binder and scenario guide for March 29, 2011 EP Dress Rehearsal

#### Section 4OA1

DAEC PI Report for Unplanned Scrams per 7000 Critical Hours for January, 2010 through  
December, 2010  
DAEC PI Report for Unplanned Scrams with Complications for January, 2010 through  
December, 2010  
DAEC PI Report for Unplanned Power Changes per 7000 Critical Hours for January, 2010  
through December, 2010

#### Section 4OA2

CR 01608645; Operating Crews Not Entering AOP 903 when Less than 0 DEG F  
Quick Hit Assessment Report SA00597079; DAEC Outage Fleet Lessons Learned  
CR 01610265; 2 Reactor SRVs Indicated Elevated Tailpipe Temperature Post RFO  
CR 01610274; 2 of 8 HCU Accumulators Worked in RFO Have Received Numerous Alarms  
CR 01610286; Multiple AOVs Worked During RFO Have Had Deficiencies  
DAEC Fire Plan – Volume 1, Program; Revision 58  
ACP 1412.4; Impairments to Fire Protection Systems; Revision 57  
CAP 073385; CAQ – Inadequacy in Fire Patrols Identified  
CAP 073464; CAQ – Potential Fire Patrol Area Missed

#### Section 4OA3

CR 01610151; CV1065A Failed Open Resulting in Loss of Feedwater Heating  
AOP 646; Loss of Feedwater Heating; Revision 20  
AOP 255.2; Power/Reactivity Abnormal Change; Revision 39  
CR 00593949; Loss of SDC During RPS Restoration  
CR 594231; Seismic Adequacy of 1T-217

## LIST OF ACRONYMS USED

ACP	Administrative Control Procedure
ADAMS	Agencywide Document Access Management System
AFP	Area Fire Plan
ALARA	As-Low-As-Is-Reasonably-Achievable
AOP	Abnormal Operating Procedure
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
CV	Control Valve
DAEC	Duane Arnold Energy Center
DBE	Design Basis Earthquake
DRP	Division of Reactor Projects
ESW	Emergency Service Water
FPIR	Fire Protection Impairment Request
HPCI	High Pressure Coolant Injection
HVAC	Heating Ventilation and Air Conditioning
IMC	Inspection Manual Chapter
IP	Inspection Procedure
IPOI	Integrated Plant Operating Instruction
LER	Licensee Event Report
LPL	Licensed Power Level
MO	Motor Operator
MSDT	Moisture Separator Drain Tank
MSO	Multiple Spurious Operations
MWth	Megawatts Thermal
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NFPA	National Fire Protection Association
NRC	U.S. Nuclear Regulatory Commission
NWCR	Northwest Control Room
OI	Operating Instruction
PARS	Publicly Available Records System
PI	Performance Indicator
PM	Planned Maintenance or Post-Maintenance
PPC	Plant Process Computer
RASP	Risk-Assessment Standardized Project
RCIC	Reactor Core Isolation Cooling
RCS	Reactor Coolant System
RFO	Refueling Outage
RHR	Residual Heat Removal
RIS	Regulatory Information Summary
SBDG	Standby Diesel Generator
SBGT	Standby Gas Treatment
SBLC	Standby Liquid Control
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SPDS	Safety Parameter Display System
SRA	Senior Risk Analyst

TS	Technical Specification
TSC	Technical Support Center
UFSAR	Updated Final Safety Analysis Report
WO	Work Order

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Sincerely,

**/RA/**

Kenneth Riemer, Chief  
Branch 2  
Division of Reactor Projects

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Letter to C. Costanzo from K. Riemer dated May 11, 2011

SUBJECT: DUANE ARNOLD ENERGY CENTER INTEGRATED INSPECTION REPORT  
05000331/2011002

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