**UNITED STATES**
**NUCLEAR REGULATORY COMMISSION**
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, IL 60532-4352

August 2, 2011

Mr. Peter Wells
Vice President
NextEra Energy Duane Arnold, LLC
3277 DAEC Road
Palo, IA 52324-9785

SUBJECT: DUANE ARNOLD ENERGY CENTER INTEGRATED INSPECTION REPORT 05000331/2011003

Dear Mr. Wells:

On June 30, 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 July 7, 2011, with Mr. D. Curtland 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 self-revealed finding of very low safety significance was identified. The finding involved a violation of NRC requirements. However, because of the very low safety significance, and because the issue was entered into your corrective action program, the NRC is treating the issue as a non-cited violation (NCV) in accordance with Section 2.3.2 of the NRC Enforcement Policy.

If you contest the subject or severity of this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001, with 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 aspect 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.

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 05000331/2011003
w/Attachment: Supplemental Information

cc w/encl: Distribution via ListServ

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

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| Docket No: | 50-331 |
| License No: | DPR-49 |
| Report No: | 05000331/2011003 |
| Licensee: | NextEra Energy Duane Arnold, LLC |
| Facility: | Duane Arnold Energy Center |
| Location: | Palo, IA |
| Dates: | April 1 through June 30, 2011 |
| Inspectors: | L. Haeg, Senior Resident Inspector<br>R. Murray, Resident Inspector<br>A. Scarbeary, Reactor Engineer<br>M. Munir, Reactor Inspector<br>D. Jones, Reactor Inspector |
| Approved by: | Kenneth Riemer, Chief<br>Branch 2<br>Division of Reactor Projects |

Enclosure

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## SUMMARY OF FINDINGS

IR 05000331/2011003, 04/01/2011 – 06/30/2011; Duane Arnold Energy Center; Post-Maintenance Testing.

This report covers a three-month period of inspection by resident inspectors and announced baseline inspections by regional inspectors. One self-revealed Green finding was identified by the inspectors. The finding was considered a non-cited violation (NCV) of NRC regulations. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process". Findings for which the Significance Determination Process 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: 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 when opening MO-1044 (main steam line drain orifice valve) to conduct preventive maintenance on its associated control breaker led to an unanticipated increase in core thermal power. Specifically, reactor core thermal power exceeded the facility's maximum-licensed steady state power level [LPL] of 1912 megawatts thermal (MWth) during the conduct of model work order (WO) 1282557. Although the WO identified that opening MO-1044 had a reactivity impact; Form NG-008R, "Reactivity Management Screening Checklist", was not performed which would have required a more rigorous consideration of the impact of the activity on current plant conditions and whether any compensatory measures were needed. Therefore, conservative actions to reduce reactor power prior to opening MO-1044 to preclude the temperature transient and subsequent positive reactivity addition were not taken by the operating crew. The licensee entered the issue into the corrective action program (CAP) as condition report (CR) 01643412, revised station procedures, and reviewed existing model WOs to ensure that the reactivity impact would be considered and evaluated prior to performance of the reactivity impacted activities.

  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 the performance deficiency was sufficiently similar to Example 8.a of IMC 0612, Appendix E, "Examples of Minor Issues." 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 Human Performance, having work control components, and involving aspects associated with appropriately planning work activities by incorporating compensatory actions. [H.3(a)] (Section 1R19)

## B. Licensee-Identified Violations

None.

## 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 of Offsite and Alternate AC Power Systems

a. Inspection Scope

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

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

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

- The actions to be taken when notified by the TSO that the post-trip voltage of the offsite power system at the plant would not be acceptable to assure the continued operation of the safety-related loads without transferring to the onsite power supply;
- The compensatory actions identified to be performed if it would not be possible to predict the post-trip voltage at the plant for the current grid conditions;
- A re-assessment of plant risk based on maintenance activities which could affect grid reliability, or the ability of the transmission system to provide offsite power; and
- The communications between the plant and the TSO when changes at the plant could impact the transmission system, or when the capability of the transmission system to provide adequate offsite power was challenged.

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

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

b. Findings

No findings were identified.

.2 Summer Seasonal Readiness Preparations

a. Inspection Scope

The inspectors performed a review of the licensee's preparations for summer weather for selected systems, including conditions that could lead to an extended drought.

During the inspection, the inspectors focused on plant specific design features and the licensee's procedures used to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the Updated Final Safety Analysis Report (UFSAR) and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant specific procedures. Documents reviewed are listed in the Attachment to this report. The inspectors also reviewed CAP items to verify that the licensee was identifying adverse weather issues at an appropriate threshold and entering them into their CAP in accordance with station corrective action procedures. The inspectors' reviews focused specifically on the following plant systems:

- Pumphouse Heating, Ventilation and Air Conditioning (HVAC) System;
- Control Building HVAC System; and
- Startup and Standby Transformers.

This inspection constituted one seasonal adverse weather 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' River Water Supply subsystem with 'B' River Water Supply out-of-service for planned maintenance;

- 'A' Standby Diesel Generator (SBDG) with 'B' SBDG out-of-service for planned maintenance; and
- 'A' Core Spray subsystem with 'B' Core Spray out-of-service for planned maintenance.

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

These activities constituted three partial system walkdown samples as defined in IP 71111.04-05.

b. Findings

No findings were identified.

1R05 Fire Protection (71111.05)

.1 Routine Resident Inspector Tours (71111.05Q)

a. Inspection Scope

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

- Area Fire Plan (AFP) 25; Cable Spreading Room;
- AFP 69-72; Main, Auxiliary, Standby, and Startup Transformers;
- AFP 7 and 9; Reactor Building Laydown Area, Waste Tank Room, Reactor Building Closed Cooling Water and Jungle Room;
- AFP 21 and 22; North and South Turbine Operating Floors; and
- AFP 26 and 27; Control Building Control Room Complex, Control Room HVAC Room.

The inspectors reviewed areas to assess if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capability, maintained passive fire protection features in good material condition, and implemented adequate

compensatory measures for out-of-service, degraded or inoperable fire protection equipment, systems, or features in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to impact equipment which could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the Attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's CAP. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On April 4, 2011, the inspectors observed a fire brigade activation for an unannounced fire drill. Based on this observation, the inspectors evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies; openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were:

- proper wearing of turnout gear and self-contained breathing apparatus;
- proper use and layout of fire hoses;
- employment of appropriate fire fighting techniques;
- sufficient firefighting equipment brought to the scene;
- effectiveness of fire brigade leader communications, command, and control;
- search for victims and propagation of the fire into other plant areas;
- smoke removal operations;
- utilization of pre-planned strategies;
- adherence to the pre-planned drill scenario; and
- drill objectives.

Documents reviewed are listed in the Attachment to this report.

This inspection constituted one annual fire protection inspection sample as defined in IP 71111.05-05.

b. Findings

No findings were identified.

1R06 Flooding (71111.06)

.1 Underground Vaults

a. Inspection Scope

The inspectors selected underground bunkers/manholes subject to flooding that contained cables whose failure could disable risk-significant equipment. The inspectors determined that the cables were not submerged, that splices were intact, and that appropriate cable support structures were in place. In those areas where dewatering devices were used, such as a sump pump, the device was functional and level alarm circuits were set appropriately to ensure that the cables would not be submerged. In those areas without dewatering devices, the inspectors verified that drainage of the area was available, or that the cables were qualified for submergence conditions. The inspectors also reviewed the licensee's corrective action documents with respect to past submerged cable issues identified in the corrective action program to verify the adequacy of the corrective actions. The inspectors performed a walkdown of the following underground bunkers/manholes subject to flooding:

- Manholes 1MH109, 1MH110, 1MH111, 1MH112.

This inspection constituted one underground vaults sample as defined in IP 71111.06-05.

b. Findings

No findings were identified.

1R07 Annual Heat Sink Performance (71111.07)

a. Inspection Scope

The inspectors reviewed the licensee's testing of the SBDG heat exchangers to verify that potential deficiencies did not mask the licensee's ability to detect degraded performance, to identify any common cause issues that had the potential to increase risk, and to ensure that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspectors reviewed the licensee's observations as compared against acceptance criteria, the correlation of scheduled testing and the frequency of testing, and the impact of instrument inaccuracies on test results. Inspectors also verified that test acceptance criteria considered differences between test conditions, design conditions, and testing conditions. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review (71111.11Q)

a. Inspection Scope

On May 23, 2011, the inspectors observed a crew 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 training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

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

The crew's performance in these areas was compared to pre-established operator action expectations and successful critical task completion requirements.

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:

- 'B' SBDG; and
- Plant Radiation Monitors.

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

- implementing appropriate work practices;
- identifying and addressing common cause failures;

- scoping of systems in accordance with 10 CFR 50.65(b) of the maintenance rule;
- characterizing system reliability issues for performance;
- charging unavailability for performance;
- trending key parameters for condition monitoring;
- ensuring 10 CFR 50.65(a)(1) or (a)(2) classification or re-classification; and
- verifying appropriate performance criteria for structures, systems, and components/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.

These activities constituted two quarterly maintenance effectiveness samples as defined in IP 71111.12-05.

b. Findings

No findings were identified.

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

a. Inspection Scope

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

- Work Week 1117 Aggregate Risk;
- Reactor Core Isolation Cooling (RCIC) room coolers;
- 161 Kilovolt (kV) West Bus testing; and
- Work Week 1122 Aggregate Risk.

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.

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

b. Findings

No findings were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- Air leakage from 'B' SBDG air receiver compartment flange;
- 'B' Emergency Service Water (ESW) auto-vent not closing after system startup;
- 'B' SBDG jacket water heat exchanger plug installation issues;
- 'B' SBDG load spiking during slow start surveillance test;
- 'B' intake structure exhaust damper did not open during testing; and
- 1A4 essential bus incoming and running volts greater than allowable by surveillance test.

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that TS operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the TS and UFSAR to the licensee's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Documents reviewed are listed in the Attachment to this report.

These activities constituted six 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 modifications:

- Temporary Modification 11-004; Temporary Hydrogen for Main Generator after Hydrogen Pad Fire; and

- Temporary Modification 11-005; Restore Hydrogen Supply to Hydrogen Water Chemistry and Main Generator after Hydrogen Pad Fire.

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, as applicable, performed field verifications to ensure that the modifications were installed as directed; the modifications operated as expected; modification testing adequately demonstrated continued system operability, availability, and reliability; and that operation of the modifications did not impact the operability of any interfacing systems. Lastly, the inspectors discussed the temporary modification with operations, engineering, and training 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.

These activities constituted two temporary modification samples as defined in IP 71111.18-05.

b. Findings

No findings were identified.

.2 Permanent Plant Modifications

a. Inspection Scope

The following engineering design package was reviewed and selected aspects were discussed with engineering personnel:

- 'B' Essential Bus Degraded Voltage Relay Modification.

This document and related documentation were reviewed for adequacy of the associated 10 CFR 50.59 safety evaluation screening, consideration of design parameters, implementation of the modification, post-modification testing, and relevant procedures, design, and licensing documents were properly updated. The inspectors observed ongoing and completed work activities to verify that installation was consistent with the design control documents. The modification changed the reset voltage of the relay so it may reset at a lower value (0.5% vs. 3% of dropout voltage), allowing recovery of essential buses at lower voltage values. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

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

- 161 kV west bus lockout relay testing following corrective maintenance;
- 'B' SBDG testing following corrective maintenance;
- 1D43 testing following corrective maintenance;
- 161 kV East Bus lockout relay testing following corrective maintenance; and
- Main steam line drain orifice valve supply breaker maintenance.

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

These activities constituted five post-maintenance testing samples as defined in IP 71111.19-05.

b. Findings

(1) Work Instructions did not Include Reactivity Impact Evaluation for Preventive Maintenance Activity

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 when opening MO-1044 (main steam line drain orifice valve) to conduct preventive maintenance on its associated control breaker led to an unanticipated increase in core thermal power. Specifically, reactor core thermal power exceeded the facility's LPL of 1912 MWth during the conduct of model work order WO 1282557. Although the WO identified that opening MO-1044 had a reactivity impact; Form NG-008R, "Reactivity Management Screening Checklist," was not performed which would have required a more rigorous consideration of the impact of the activity on current plant conditions and whether any compensatory measures were needed. Therefore, conservative actions to reduce reactor power prior to opening

MO-1044 to preclude the temperature transient and subsequent positive reactivity addition were not taken by the operating crew.

Description: At approximately 08:49 hrs on April 20, 2011, the control room operators held a pre-job brief to conduct WO 1282557. This work order required that MO-1044 be opened (placed in safety-related position) prior to de-energizing its control breaker to perform preventive maintenance. The operators acknowledged that the opening of MO-1044 could have a positive reactivity impact, but elected to closely monitor reactor core thermal power and take action to reduce power should it begin to rise. Following the opening of the MO-1044 control breaker, instantaneous reactor core thermal power rose from approximately 1911 MWth to 1914 MWth in a rapid fashion (i.e., more rapidly than anticipated in order to take actions to reduce reactor power prior to exceeding the LPL). Operators identified the condition and reduced reactor recirculation flow to decrease reactor core thermal power to approximately 1909 MWth.

The inspectors reviewed the circumstances surrounding the event, including WO 1282557, work order planning procedures, operating instructions for the plant, and shift operations logs. The inspectors also discussed the event with the shift manager on-duty the morning of the event and reviewed the subsequent apparent cause evaluation. The inspectors noted that WO 1282557 contained the note "Reactivity Impact" under the "Critical Aspects" section; however, Form NG-008R, "Reactivity Management Screening Checklist," was not performed during the work planning process. Form NG-008R is required to be performed per Administrative Control Procedure (ACP) 1408.1, "Work Order Task(s)," for work involving reactivity-related components or systems as listed in ACP 1408.1, Attachment 7, "Reactivity Systems." The inspectors noted that ACP 1408.1, Attachment 7, did not contain the MO-1044 system designator (Main Steam Downstream of MSIVs), and that the WO 1282557 task attribute for reactivity management stated "No." The inspectors noted, however, that ACP 1408.1, Attachment 7, stated, in part, that "individual plant components not covered by the list may also affect reactivity controls."

Analysis: The inspectors determined that ACP 1408.1 was inadequate in that the MO-1044 system designator was not listed in Attachment 7 as a system that could impact reactivity. Had the MO-1044 system designator been included in the list, it would have been reasonable to conclude that the reactivity management attribute of WO 1282557 would have been "Yes," and a Form NG-008R would have been performed. This screening would have allowed for evaluation of the reactivity impact and determination of the need for any compensatory measures. The failure to prescribe a procedure 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 the performance deficiency was sufficiently similar to Example 8.a of IMC 0612, Appendix E, "Examples of Minor Issues." Specifically, ACP 1408.1 was inadequate such that NG-008R was not performed, contributing to the LPL being exceeded. The inspectors concluded this finding was associated with the Barrier Integrity Cornerstone.

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 Human Performance, having work control components, and involving aspects associated with appropriately planning work activities by incorporating compensatory actions. Specifically, the inspectors noted that although ACP 1408.1 was deficient, several opportunities and sufficient available information existed to identify the need for a reactivity screening in order to take conservative action prior to opening MO-1044. [H.3(a)]

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 procedures of a type appropriate to the circumstances. Contrary to this requirement, on April 20, 2011, the licensee failed to prescribe an adequate work planning procedure appropriate to the circumstances prior to conducting WO 1282557. Corrective actions included revision to ACP 1408.1, and other applicable instructions and procedures, to ensure that work with the potential to impact reactivity would be identified and evaluated to determine whether compensatory actions were required prior to beginning work. Because this violation was of very low safety significance, was not repetitive or willful, and was entered into the licensee's CAP as CR 01643412, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy (NCV 05000331/2011003-01, Work Instructions did not Include Reactivity Impact Evaluation for Preventive Maintenance Activity).

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:

- Surveillance Test Procedure (STP) 3.3.3.2-02; Remote Shutdown Panel Functional Test for Division 2 Switchgear and 'B' SBDG (routine);
- STP 3.6.1.7-01; Drywell – Suppression Chamber Vacuum Breaker Operability Test (routine);
- STP 3.3.6.1-42; RCIC System Isolation Logic System Functional Test (routine);
- STP 3.8.1-04A; 'A' Standby Diesel Generator Operability Test (Slow Start from Norm Starting Air) (routine);
- STP 3.8.7-01; Low Pressure Coolant Injection Swing Bus AC Transfer Test (routine); and
- STP NS791016; KAMAN Monitor Inoperable (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 TSs, the UFSAR, procedures, and applicable commitments;
- measuring and test equipment calibration was current;
- test equipment was used within the required range and accuracy; applicable prerequisites described in the test procedures were satisfied;
- test frequencies met TS requirements to demonstrate operability and reliability; tests were performed in accordance with the test procedures and other applicable procedures; jumpers and lifted leads were controlled and restored where used;
- test data and results were accurate, complete, within limits, and valid;
- test equipment was removed after testing;
- where applicable for inservice testing activities, testing was performed in accordance with the applicable version of Section XI, American Society of Mechanical Engineers code, and reference values were consistent with the system design basis;
- where applicable, test results not meeting acceptance criteria were addressed with an adequate operability evaluation or the system or component was declared inoperable;
- where applicable for safety-related instrument control surveillance tests, reference setting data were accurately incorporated in the test procedure;
- where applicable, actual conditions encountering high resistance electrical contacts were such that the intended safety function could still be accomplished;
- prior procedure changes had not provided an opportunity to identify problems encountered during the performance of the surveillance or calibration test;
- equipment was returned to a position or status required to support the performance of its safety functions; and
- all problems identified during the testing were appropriately documented and dispositioned in the CAP.

Documents reviewed are listed in the Attachment to this report.

These activities constituted six routine surveillance testing samples 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 preparedness exercise on May 10, 2011, to identify any weaknesses and deficiencies in classification, notification, and protective action recommendation development activities. The inspectors observed emergency response operations in the technical support center (TSC) to determine whether the event classification, notifications, and protective action recommendations were performed in accordance with procedures. The inspectors also attended the licensee exercise 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 exercise controller package and other documents listed in the Attachment to this report.

This inspection constituted one emergency preparedness drill observation sample as defined in IP 71114.06-05.

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 Reactor Coolant System Leakage

a. Inspection Scope

The inspectors sampled licensee submittals for the RCS Leakage performance indicator (PI) for the period from the 2nd quarter 2010 through the 1st quarter 2011. To determine the accuracy of the PI data reported during those periods, PI definitions and guidance contained in the Nuclear Energy Institute Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 6, dated October 2009, was used. The inspectors reviewed the licensee's operator logs, RCS leakage tracking data, CRs, event reports and NRC Integrated Inspection Reports for the period of April 1, 2010, through March 31, 2011, to validate the accuracy of the submittals. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the PI data collected or transmitted for this indicator and none were identified. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

4OA2 Identification and Resolution of Problems (71152)

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

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

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify 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 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's CAP and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors' review was focused on repetitive equipment issues, but also considered the results of daily inspector CAP item screening discussed in Section 4OA2.2 above, licensee trending efforts, and licensee human performance results. The inspectors' review nominally considered the six month period of January 2011 through June 2011, although some examples expanded beyond those dates where the scope of the trend warranted.

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

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

b. Findings

No findings were identified.

.4 Annual Sample: Review of Operator Workarounds

a. Inspection Scope

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

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

operator aids or tools being used to compensate for material deficiencies were also assessed to identify any potential sources of unidentified operator workarounds.

This review constituted one operator workaround annual inspection sample as defined in IP 71152-05.

b. Findings

No findings were identified.

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

.1 Hydrogen Pad Fire and Declaration of Alert

a. Inspection Scope

The inspectors reviewed the plant's response to a fire at the site's hydrogen pad on May 3, 2011. Following a normally scheduled delivery of hydrogen and completing some inspections of the spent hydrogen trailer, the delivery driver truck fell off the spent trailer and damaged the supply line connecting the new trailer to the site's hydrogen manifold inlet valves. The separation of the line created a spark and ignited the hydrogen leaking from the newly delivered trailer. The resultant fire caused the site to ultimately declare an Alert, based on evacuating the pumphouse which contains safety--related equipment, including the Emergency Service Water and Residual Heat Removal Service Water pumps. Evacuation of the pumphouse was for personnel safety and did not affect the operation of any equipment in the pumphouse. Once the fire was under control, the site determined there was no damage to the pumphouse, and upon verification that oxygen levels supported personnel in the area, the site restored access to the pumphouse and downgraded to an Unusual Event. Once the fire was reported to be out, the hydrogen system was isolated, and the hydrogen trailers were depressurized, the licensee exited the Unusual Event.

The inspectors responded to the main control room and technical support center to monitor licensee actions, including assessment of reactor safety and physical security impact, event classification and notifications, and personnel performance. Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

.2 (Closed) Licensee Event Report (LER) 05000331/2010-004-00 and -01: Linear Indication Found During Examination of Safe-End to Nozzle Welds

a. Inspection Scope

This event, which occurred on October 29, 2010, involved a flaw indication identified by the licensee while performing a scheduled ultrasonic examination of the reactor recirculation inlet nozzle welds during a refuel outage. The circumferential flaw indication found in safe-end to nozzle weld RRA-F002A was approximately 6.5" long,

71 percent through wall, and identified as inner diameter surface connected. The location did not result in any pressure boundary leakage and maintained the American Society of Mechanical Engineers Code IWB-3640 required safety factors.

The licensee determined the cause of the event to be inter-granular stress corrosion cracking-susceptible filler material used for the 1978 safe-end replacement. Corrective actions included repair by weld overlay following NRC verbal approval of the licensee's repair relief request and expanding the initial inspection population for extent of condition to include three additional welds. The subsequent ultrasonic examination determined the applied weld overlay and the expanded sample of three additional welds to be acceptable. The inspectors reviewed the root cause evaluation. Documents reviewed as part of this inspection are listed in the Attachment to this report. This LER is closed.

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

b. Findings

No findings were identified.

.3 Retraction of Event Notification (EN) 46645 for High Pressure Coolant Injection (HPCI) System Inoperable

a. Inspection Scope

The inspectors reviewed the licensee's evaluation and basis for retracting EN 46645, which was originally reported as a result of the station declaring HPCI inoperable due to Flow Indicating Controller processor value indicating 542 gallons per minute while in a standby readiness condition. An engineering evaluation performed by the licensee determined the system remained capable of performing its specified safety functions, was not a safety system functional failure, and not reportable.

Documents reviewed are listed in the Attachment to this report.

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

b. Findings

No findings were identified.

4OA5 Other Activities

.1 (Closed) NRC Temporary Instruction (TI) 2515/183, "Followup to the Fukushima Daiichi Nuclear Fuel Damage Event"

The inspectors assessed the activities and actions taken by the licensee to assess its readiness to respond to an event similar to the Fukushima Daiichi nuclear plant fuel damage event. This included (1) an assessment of the licensee's capability to mitigate conditions that may result from beyond design basis events, with a particular emphasis on strategies related to the spent fuel pool, as required by NRC Security Order Section B.5.b issued February 25, 2002, as committed to in severe accident management guidelines, and as required by 10 CFR 50.54(hh); (2) an assessment of

the licensee's capability to mitigate station blackout conditions, as required by 10 CFR 50.63 and station design bases; (3) an assessment of the licensee's capability to mitigate internal and external flooding events, as required by station design bases; and (4) an assessment of the thoroughness of the walkdowns and inspections of important equipment needed to mitigate fire and flood events, which were performed by the licensee to identify any potential loss of function of this equipment during seismic events possible for the site.

Inspection Report 05000331/2011010 (ML111320387) documented detailed results of this inspection activity. Following issuance of the report, the inspectors conducted detailed follow-up on selected issues.

.2 (Closed) NRC Temporary Instruction (TI) 2515/184, "Availability and Readiness Inspection of Severe Accident Management Guidelines (SAMGs)"

On May 27, 2011, the inspectors completed a review of the licensee's severe accident management guidelines (SAMGs), implemented as a voluntary industry initiative in the 1990's, to determine (1) whether the SAMGs were available and updated, (2) whether the licensee had procedures and processes in place to control and update its SAMGs, (3) the nature and extent of the licensee's training of personnel on the use of SAMGs, and (4) licensee personnel's familiarity with SAMG implementation.

The results of this review were provided to the NRC task force chartered by the Executive Director for Operations to conduct a near-term evaluation of the need for agency actions following the Fukushima Daiichi fuel damage event in Japan. Plant-specific results for the Duane Arnold Energy Center were provided as an Enclosure to a memorandum to the Chief, Reactor Inspection Branch, Division of Inspection and Regional Support, dated June 1, 2011, (ML111520396).

4OA6 Management Meetings

.1 Exit Meeting Summary

On July 7, 2011, the inspectors presented the inspection results to Mr. D. Curtland, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors confirmed that none of the potential report input discussed was considered proprietary.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

## KEY POINTS OF CONTACT

Licensee

P. Wells, 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
B. Murrell, Licensing Engineer Analyst

Nuclear Regulatory Commission

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

## LIST OF ITEMS OPENED, CLOSED AND DISCUSSED

Opened

| | | |
|---|---|---|
| 05000331/2011003-01 | NCV | Work Instructions did not Include Reactivity Impact Evaluation for Preventive Maintenance Activity (Section 1R19) |

Closed

| | | |
|---|---|---|
| 05000331/2011003-01 | NCV | Work Instructions did not Include Reactivity Impact Evaluation for Preventive Maintenance Activity (Section 1R19) |
| 05000331/2010-004-00 | LER | Linear Indication Found During Examination of Safe-End to Nozzle Welds (Section 4OA3.2) |
| 05000331/2010-004-01 | LER | Linear Indication Found During Examination of Safe-End to Nozzle Welds (Section 4OA3.2) |
| 2515/183 | TI | Followup to the Fukushima Daiichi Nuclear Station Fuel Damage Events (Section 4OA5.1) |
| 2515/184 | TI | Availability and Readiness Inspection of Severe Accident Management Guidelines (Section 4OA5.2) |

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

CR 01651095; Need to Clarify Fleet Seasonal Readiness Procedure
System Engineering Seasonal Readiness Reviews Completed September 2010
OP-AA-102-1002 (DAEC); Seasonal Readiness; Revision 4
OP-AA-102-1002; Seasonal Readiness; Revision 0
CR 01649782; Unable to Achieve Desired Flow Specified in WO40049457
Abnormal Operating Procedure 304; Grid Instability; Revision 26
ACP 101.16; Midwest ISO: Communication and Mitigation Protocols for Nuclear Plant/Electric System Interfaces; Revision 6
ACP 1408.23; Controls to the DAEC Switchyard; Revision 12

Section 1R04

Operating Instruction (OI) 410A1; River Water Supply System Electrical Lineup; Revision 9
OI 410A2; "A" River Water Supply System Valve Lineup and Checklist; Revision 18
OI 324A10; SBDG Standby/ Readiness Condition Checklist; Revision 13
OI 151A2; "A" Core Spray System Valve Lineup and Checklist; Revision 4
OI 151A6; Core Spray System Control Panel Lineup; Revision 2
OI 151A1; Core Spray System Electrical Lineup; Revision 3
BECH-M121; P&ID Core Spray System; Revision 38
CR 01655948; Planning for Lube and Inspect of B Core Spray Test Bypass
CR 01656478; Core Spray OI Steps Cannot Be Performed as Written

Section 1R05

AFP 18; Turbine Building Ground Floor and Tube Pulling Area EL. 757'-6"; Revision 28
AFP 25; Control Building Cable Spreading Room; Revision 26
AFP 69; Main Transformer 1X1; Revision 4
AFP 70; Standby Transformer 1X4; Revision 4
AFP 71; Startup Transformer 1X3; Revision 3
AFP 72; Auxiliary Transformer 1X2; Revision 2
AFP 22; South Turbine Operating Floor, El. 780'-0"; Revision 25
AFP 21; Turbine Building North Turbine Operating Floor; Revision 24
AFP 07; Reactor Building Laydown Area, Corridor and Waste Tank Area and Spent Resin Tank Room El. 786'; Revision 30
AFP 09; Reactor Building Closed Cooling Water Heat Exchanger Area, Equipment Hatch Area and Jungle Room El. 812'
CR 01656870; 1G001A: Oil Puddle Found at Turbine Front Standard
AFP 26; Control Building Control Room Complex; Revision 32
AFP 27; Control Building Control Room HVAC Room; Revision 25

Section 1R07

ACP 1208.4; GL 89-13 Heat Exchanger Performance and Trending
CR 01647644; Eddy Current Testing of 'B' Emergency Diesel Generator – Jacket Cooler
CR 01647646; Eddy Current Testing Results on 'B' EDG Lube Oil Cooler
CR 01609473; Pull and Replace Tubes in the EDG Heat Exchangers
CR 01611126; Design, Fabricate and Install 'B' EDG Heat Exch Piping Modification
CR 01611153; Install New 'A' EDG Jacket Cooling Water Heat Exch Tube Bundle
CR 01611154; Install New 'B' EDG Jacket Cooling Water Heat Exch Tube Bundle
CR 01647708; 48 Tube Plugs Installed @ Incorrect Depth on 1E053B
CR 01661608; Inner Flange on West Side of HX is Leaking Approx 2 DPM

Section 1R12

System Health Report for Standby Diesel Generators for 4/1/2011 – 6/30/2011
STP 3.8.1-04A; A Standby Diesel Generator Operability Test (Slow Start from Norm Start Air); Revision 9
OI 324A10; SBDG Standby/ Readiness Condition Checklist; Revision 14
WO 40082683; AG031/LOP: Lube Oil Pump is Degraded
WO 4008316; Increase in Vibration of Motor Bearing for 1G031/LOP-M

Section 1R13

Work Planning Guideline-1; Work Process Guideline; Revision 46
Work Planning Guideline-2; Online Risk Management Guideline; Revision 59
OP-AA-104-1007; Online Aggregate Risk; Revision 2
WM-AA-1000; Work Activity Risk Management; Revision 8
WM-AA-1000 (DAEC); Work Activity Risk Management (DAEC); Revision 0
OP-AA-102-1003; Guarded Equipment; Revision 2
OP-AA-102-1003 (DAEC); Guarded Equipment (DAEC Specific Information); Revision 13
Work Week 1117 WARM Summary and Risk Analysis; Revisions 0-3
WO 40082683; 1G031/ LOP: Lube Oil Pump is Degraded
WO 40083126; Increase in Vibration of Motor Bearing for 1G031/LOP-M
May 3, 2011 Online Aggregate Risk Analysis Worksheet for Dayshift
CR 1646785; 1T-35 LO-LO Level Annunciator in on 1C93 (A-6)
Work Activity Risk Evaluation Form for WO 40081767
Work Week 1122 WARM Summary and Risk Analysis

Section 1R15

CR 01636955; B Emergency Diesel Generator (EDG): Air Leakage from Air Receiver Compartment Flange
CR 01647708; 48 Tubes Plugged at Incorrect Depth on 1E053B
CR 01637943; AV4929D Did Not Close After B ESW Pump Start
OI 454 QRC 1; ESW Rapid Start; Revision 4
CR 01652890; Entered Unplanned TS Limiting Condition for Operation Due to Difference in Voltages; 5/18/2011
Condition Evaluation (CE) 003209; Voltage Deviation Too High to Swap from Startup to Aux Transformer
STP 3.3.3.2-02; Remote Shutdown Panel Functional Test for Division 2 Switchgear and B SBDG; Revision 13

OI 304.1; Operating Instruction 4160V/480V Non Essential Electrical Distribution System; Revision 71
CR 01657282; 'B' EDG Load Spikes During Monthly STP 3.8.1-04B
STP 3.8.1-04B; B Standby Diesel Generator Operability Test (Slow Start from Norm Start Air); Revision 14
CR 01652072; Damper Operator DO-7713B Did Not Cycle During Test
CR 01663714; Documentation for Not Performing a Technical Assessment for Reportability (TAR)
1A4 Essential Bus Incoming and Running Volts Greater Than Allowable by STP

Section 1R18

Temporary Modification 11-004; Temporary Hydrogen for Main Generator after Hydrogen Pad Fire
Calculation (CAL) E96-015; 10 CFR 50 Appendix R III.G/III.L Assessment for Fire Area EX1; Revision 3
Fire Protection Evaluation B96-001; Barrier Evaluation of Yard (EX1) Fire Area; Revision 2
CR 01648891; SAFETY – Hydrogen Bottle Storage/ Temp Mod
Temporary Modification 11-005; Restore Hydrogen to HWC and Main Generator after Hydrogen Pad Fire
CR 01651625; Temporary Modification 11-05 SV8901 Failed Post Construction Test
CR 01651766; Hydrogen Truck Hose for Temporary Modification 11-05 Too Short
CR 01651762; Temporary Modification 11-05 Hydrogen Bottle Rack Manifold Valve Leaked
Engineering Change (EC) 0156051; Essential Bus Degraded Voltage Relay Replacement
CAL-E95-006; 4.16 kV Essential Bus Degraded Voltage Setpoint Calculation; Revision 6
CAL-E08-004; Main AC Electrical Distribution Analysis, Revision 0
Screening 9091; 10 CFR 50.59 Screening for EC 0156051; 5/27/2010
CAP 054037; Condition Adverse to Quality Standby Transformer Voltage Concerns
B455-02; Equipment Specific Maintenance Procedure Relay ABB Type 27N; Revision 3
WO 01285072; Install New DVR Relays per ECP 1862

Section 1R19

WO 40048412; STP 3.8.1-05-B B-SBDG Operability Test (Slow Start)
STP 3.8.1-05B; B Standby Diesel Generator Operability Test (Slow Start from Emergency Starting Air); Revision 13
WO 01384454; Emergency Service Water Operability Test 'B'
WO 40081767; 86B1: 161 kV West Bus Lockout Relay Trip Testing
CR 01652298; Lack of Operations Planning Support on 161 kV West Bus Testing
CR 01653321; West Bus Lockout Relays Tripped Unexpectedly During Testing
OI 304.1A22; Simplified Substation Drawing; Revision 0
WO 40082515-01; 86B2: 161kV East Bus LO Relay Trip Testing By DAEC & ITC
CR 01656872; E. Bus Breaker Failure Alarm & BC 9180 (G) to 8090 Not Wired
CR 1655001; Question on Guarded Equipment for Scheduled Work
Equipment Specific Maintenance Procedure; BATTRY-P319-01, Power Conversion Products Incorporated Battery Charger; Revision 29
OI-388; 250 VDC Power Distribution System; Revision 28
WO 1282422; 1D43 – Replace Current Limit/ Sensing Board and Firing Board
CR 01643412; Opening MO-1044 Changed Reactivity
WO 01282557; MA: Inspect Breaker and Motor Control Unit

ACP 1408.1; Work Order Task(s); Revision 165
NG-008R; Reactivity Management Screening Checklist; Revision 0

Section 1R22

STP 3.3.3.2-02; Remote Shutdown Panel Functional Test for Division 2 Switchgear and B SBDG, Revision 11
CR 01652033; Unrecognized B ESW Limiting Condition for Operation During STP 3.3.3.2-02
WO 40038010; Remote Shutdown Panel Functional Test for Division 2
STP 3.6.1.7-01; Drywell – Suppression Chamber Vacuum Breaker Operability Test; Revision 4
STP 3.3.6.1-42; RCIC System Isolation Logic System Functional Test; Revision 9
CR 01654098; Stripped Sliding Link While Performing RCIC Logic 3.3.6.1-42
STP 3.8.1-04A; A Standby Diesel Generator Operability Test (Slow Start from Norm Starting Air); Revision 9
WO 40052746; STP 3.8.1-04-A A Standby Diesel Generator Operability Test
OI 324A10; SBDG Standby/ Readiness Condition Checklist; Revision 13
CR 01654615; Received an Unexpected 1C93<D-5> During 3.8.1-04A
CR 01654564; Bent U-bolt Found on A EDG Lube Oil Heat Exchanger Discharge
STP 3.8.7-01; Low Pressure Coolant Injection Swing Bus AC Transfer Test; Revision 10
Fig 8.3-1, Sheet 1; Single Line Diagram; Revision 20
BECH-E104 (021); 4160V and 480V System Control and Protection; Revision 14
BECH-E104 (021B); 4160V and 480V System Control and Protection; Revision 4
STP NS791016; KAMAN Monitor Inop; Revision 14

Section 1EP6

Controller Binder and Scenario Guide for May 10, 2011 Emergency Preparedness Exercise
CR 01650242; 11EXEOF – PAR Change Incorrectly Declared
CR 01650253; 11EXCR – Loss of Safety Function Determination Incorrect
CR 01650258; 11EXEOF – Erroneous PAR from Erroneous MIDAS Dose Projection
CR 01650262; 11EXCR Issues Identified With Scenario Adequacy
CR 01650264; 11EXCR-CR Crew Did Not Monitor Met Data After CC Transferred
CR 01650278; 11EXTSC Missed Wind Change
CR 01650286; 11EX TSC – Evaluate MIDAS Scenario Vs. Field Team Data
CR 01650287; 11EX TSC – Use of Severe Accident Information by ERO Section 2RS3

Section 4OA1

DAEC PI Report for RCS Identified Leakage for April 210 through March 2011

Section 4OA2

CR 01642970; Safety 1B07/08 Load Center
CR 01655749; Actions Taken when WO Errors Arose did not Meet Standards
CR 01625976; STP 3.8.1-11 Work Did Not Include Confined Space Entry Plan
CR 01632860; Reactivity Management Identification Confusion for STP
CR 01638262; Need to Scrub Reactivity Attribute for Model Work Orders
CR 01643412; Opening MO-1044 Changed Reactivity
CR 01649838; WO 1286596 Incorrect Attributes
CR 01650784; WO 1286499 Reactivity Attribute is Incorrect
CR 01629496; From NG-007D was not used during a Reactivity PJB

CR 01626325; STP NS13E005 Risk Sheet Not Prepared
CR 01627619 1P091A Risk Changed the Day Before Implementation of Work
CR 01629163; Risk Paperwork was not Completed Until Day of Scheduled Work
CR 01637202; STP 3.6.1.6-01 Risk Evaluation Incorrect, Should be High Risk
CR 01640181; Week 1116 STP's Risk Evaluations Not Complete
CR 01654674; HPCI STP Not Recognized as High Risk for Work Week Package
CR 01662428; Work Order Not Properly Identified as High Risk
CR 01654221; Work Delayed Due to High Risk Controls

Section 4OA3

Letter NG-10-0559, Alternative to the American Society of Mechanical Engineers Section XI Requirements to Use Structural Weld Overlay Repairs as an Alternative Repair Technique at the Duane Arnold Energy Center; November 6, 2010
Report No. 1000972.401, Design Report for a Weld Overlay Repair of the Recirculation Inlet Nozzle N2A at Duane Arnold Energy Center; Revision 0
File No. 1000972.302, Flaw Evaluation for the Recirculation Inlet Nozzle N2A Safe End to Safe End Extension Weld with Weld Overlay Repair; Revision 0
File No. 1000972.312, Material Properties and Finite Element Models for Recirculation Inlet Nozzle N2A Safe End to Safe End Extension Weld Overlay Repair; Revision 0
File No. 1000972.313, Recirculation Inlet Nozzle N2A Weld Overlay Repair Thermal and Mechanical Stress Analysis Calculation; Revision 0
EN 46645; HPIC System Inoperable; dated February 26, 2011
CR 01624116; HPCI Flow Indication Reads 550 GPM in Standby Condition
TAR 01624116-09; Perform TAR on unplanned HPCI Inoperability due to standby flow indicated 550 GPM

Section 4OA5

Emergency Planning Department Manual (EPDM) 1014; Severe Accident Management Training Guidelines and Matrices; Revision 5
ACP 1406.7; Emergency Operating Procedure Maintenance Program; Revision 12
ACP 1203.52; Assessment of Potential Impact on EOPs/SAGs; Revision 0
Emergency Planning Department Manual (EPDM) Form EP-035; Drill/Exercise Objective & Evaluation Process; Revision 14
Boiling Water Reactor Owner's Group (BWROG) Severe Accident Guideline (SAG)/Plant Specific Technical Guideline (PSTG) Differences; Revision 1
SAG 1; Primary Containment Flooding; Revision 5
SAG 2; RPV, Containment, and Radioactivity Release Control; Revision 5
SAG 3; Hydrogen Control; Revision 5
CR 01650497; NRC TI-184 – Revise ACP 1406.7 to Address Maintenance of SAG
CR 01651247; TI-184 – Periodic Review of SAMG
Procedure Change Request (PCR) 01651263; ACP 1203.52 – Assessment of Potential Impact on Emergency Operating Procedures (EOPs)/SAGs
CR 01651230; NRC TI-184 Review – TSC Accident Management Team Qualification Card
CR 01652552; TI 184 Inspection – Japan Earthquake/EPDM 1014

## LIST OF ACRONYMS USED

| | |
|---|---|
| AC | Alternating Current |
| ACP | Administrative Control Procedure |
| ADAMS | Agencywide Document Access Management System |
| AFP | Area Fire Plan |
| BWROG | Boiling Water Reactor Owner's Group |
| CAL | Calculation |
| CAP | Corrective Action Program |
| CE | Condition Evaluation |
| CFR | Code of Federal Regulations |
| CR | Condition Report |
| DAEC | Duane Arnold Energy Center |
| EC | Engineering Change |
| EDG | Emergency Diesel Generator |
| EN | Event Notification |
| EOP | Emergency Operating Procedure |
| EPDM | Emergency Planning Department Manual |
| EPIP | Emergency Plan Implementing Procedure |
| ESW | Emergency Service Water |
| HPCI | High Pressure Coolant Injection |
| HVAC | Heating, Ventilation and Air Conditioning |
| IMC | Inspection Manual Chapter |
| IP | Inspection Procedure |
| IR | Inspection Report |
| kV | Kilovolt |
| LER | Licensee Event Report |
| MWth | Megawatts Thermal |
| NCV | Non-Cited Violation |
| NRC | U.S. Nuclear Regulatory Commission |
| OI | Operating Instruction |
| OWA | Operator Workaround |
| PARS | Publicly Available Records System |
| PCR | Procedure Change Request |
| PI | Performance Indicator |
| PSTG | Plant Specific Technical Guideline |
| RCIC | Reactor Core Isolation Cooling |
| RCS | Reactor Coolant System |
| SAG | Severe Accident Guideline |
| SAMG | Severe Accident Management Guideline |
| SBDG | Standby Diesel Generator |
| STP | Surveillance Test Procedure |
| TAR | Technical Assessment for Reportability |
| TI | Temporary Instruction |
| TS | Technical Specification |
| TSC | Technical Support Center |
| TSO | Transmission System Operator |
| 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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Enclosure: Inspection Report 05000331/2011003
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Letter to P. Wells from K. Riemer dated August 2, 2011

SUBJECT: DUANE ARNOLD ENERGY CENTER INTEGRATED INSPECTION REPORT 05000331/2011003

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