

July 19, 2006

Mr. Gary Van Middlesworth  
Vice-President  
Duane Arnold Energy Center  
3277 DAEC Road  
Palo, IA 52324-9785

SUBJECT: DUANE ARNOLD ENERGY CENTER  
NRC INTEGRATED INSPECTION REPORT 5000331/2006003 (DRP);  
05000331/2006010 (DRS)

Dear Mr. Van Middlesworth:

On June 30, 2006, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Duane Arnold Energy Center. The enclosed integrated inspection report documents the inspection findings which were discussed on July 11, 2006, with 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, there was one NRC-identified finding of very low safety significance, which involved a violation of NRC requirements. However, because this violation was of very low safety significance and because the issue was entered into the licensee's corrective action program, the NRC is treating this finding and issue as a Non-Cited Violation (NCV) in accordance with Section VI.A.1 of the NRC's Enforcement Policy. Additionally, a licensee identified violation is listed in Section 4OA7 of this report.

If you contest the subject or severity of a Non-Cited Violation, 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 accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of NRC's document system (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

*/RA/*

Bruce L. Burgess, Chief  
Branch 2  
Division of Reactor Projects

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

Enclosure: Inspection Report 05000331/2006003; 05000331/2006010  
w/Attachment: Supplemental Information

cc w/encl: J. Stall, Senior Vice President, Nuclear and Chief  
Nuclear Officer  
R. Helfrich, Senior Attorney  
M. Ross, Managing Attorney  
W. Webster, Vice President, Nuclear Operations  
M. Warner, Vice President, Nuclear Operations Support  
R. Kundalkar, Vice President, Nuclear Engineering  
J. Bjorseth, Site Director  
D. Curtland, Plant Manager  
S. Catron, Manager, Regulatory Affairs  
Chairman, Linn County Board of Supervisors  
D. McGhee, State Liaison Officer

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-331

License No: DPR-49

Report No: 05000331/2006003; 05000331/2006010

Licensee: Florida Power and Light Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: 3277 DAEC Road  
Palo, Iowa 52324-9785

Dates: April 1 through June 30, 2006

Inspectors: G. Wilson, Senior Resident Inspector  
J. Giessner, (Acting) Senior Resident Inspector  
R. Baker, Resident Inspector  
N. Shah, Project Engineer  
S. Sheldon, Reactor Engineer  
T. Ploski, Senior Emergency Preparedness Analyst

Observers: None

Approved by: Bruce L. Burgess, Chief  
Branch 2  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000331/2006003; 05000331/2006010; 04/01/2006 - 06/30/2006; Duane Arnold Energy Center; Maintenance Risk Assessments and Emergent Work Control.

This report covers a 3-month period of baseline resident inspection and an announced baseline inspection of emergency preparedness. The inspections were conducted by Region III reactor inspectors and the resident inspectors. 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 3, dated July 2000.

### **A. Inspector-Identified and Self-Revealed Findings**

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

- Green. A finding of very low safety significance was identified by the inspectors for the licensee's failure to conduct an adequate risk assessment of the Standby Liquid Control System (SLCS) which was removed from service for scheduled surveillances December 1, 2005, and March 1, 2006. This resulted in an unrecognized increase in the level of risk as determined by the licensee's Probabilistic Risk Assessment (PRA) model. This issue was documented in the licensee's corrective action program (CAP) as CAP 042499. The corrective actions taken included revising the procedure to insert detailed restoration steps, communications and dedicated operator requirements, as well as requirements for declaring the system inoperable and unavailable during performance of the surveillance test. An NCV of 10 CFR 50.65(a)(4) was identified for the failure to conduct an adequate risk assessment prior to conducting online maintenance involving the SLCS.

This finding is more than minor because it is associated with the Mitigating Systems Cornerstone attribute of equipment performance and adversely affected the cornerstone objective in that the licensee failed to perform an adequate risk assessment prior to conducting online maintenance. The licensee's risk assessment did not consider the risk-significant SLCS system that was out of service which, when properly evaluated, did result in an increased level of risk from a PRA perspective and would have put the licensee in a higher risk category. However, the finding was of very low safety significance because the risk deficit for Incremental Core Damage Probability was less than 1E-6 and for Incremental Large Early Release Probability was less than 1E-7. (Section 1R13)

**B. Licensee-Identified Violations**

A violation of very low safety significance, which was identified by the licensee, has been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and the corrective actions tracking numbers are listed in Section 4OA7 of this report.

## REPORT DETAILS

### Summary of Plant Status

Duane Arnold Energy Center 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 with the following exception:

- On April 18, 2006, a rapid power reduction to 55 percent reactor power was performed to permit securing and repair of a steam leak from the pump casing on the motor driven 'A' Reactor Feedwater Pump (RFP). The plant was returned to full power on April 21, 2006, following the repair, post maintenance testing, and restoration of the 'A' RFP.

### 1. REACTOR SAFETY

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

#### 1R01 Adverse Weather (71111.01)

##### .1 Situational

##### a. Inspection Scope

During the week ending April 15, 2006, the inspectors performed a detailed review of the licensee's procedures and a walkdown of areas to observe preparations for adverse weather, in particular, high winds and/or tornadoes for a total of one sample. This included plant response to a tornado warning. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. During the inspection, the inspectors focused on plant specific system design features and implementation of procedures for responding to or mitigating the effects of adverse weather. Inspection activities included, but were not limited to, a review of the licensee's adverse weather procedures, and a review of analysis and requirements identified in the Updated Final Safety Analysis Report (UFSAR). The inspectors also verified that operator actions specified by plant specific procedures were appropriate. Finally, the inspectors examined areas near vital and risk-significant equipment for potential missile hazards. These areas were adjacent to the reactor and turbine building, as well as the switchyard.

##### b. Findings

No findings of significance were identified.

.2 Summer Preparations

a. Inspection Scope

The inspectors performed a detailed review of the licensee's procedures and a walkdown of three systems to observe the licensee's preparations for summer conditions for a total of one sample. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. During the inspection, the inspectors focused on plant specific system design features and implementation of procedures for responding to or mitigating the effects of adverse weather. Inspection activities included, but were not limited to, a review of the licensee's adverse weather procedures, preparations for the summer season, and a review of analysis and requirements identified in the UFSAR.

The inspectors evaluated summer readiness of the following areas for a total of one sample:

- Pump House Heating, Ventilation, and Air-Conditioning (HVAC) during the week ending May 27, 2006;
- Transformer readiness for warm weather during week ending May 27, 2006; and
- Essential Service Water (ESW) and Residual Heat Removal Service Water (RHRSW) Controlled Ventilation during the week ending May 27, 2006.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdown

a. Inspection Scope

The inspectors performed three partial walkdowns of accessible portions of trains of risk-significant mitigating systems equipment. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. Equipment alignment was reviewed to identify any discrepancies that could impact the function of the system and potentially increase risk. Redundant or backup systems were selected by the inspectors during times when the trains were of increased importance due to the redundant trains of other related equipment being unavailable. Inspection activities included, but were not limited to, a review of the licensee's procedures, verification of equipment alignment, and an observation of material condition, including operating parameters of in-service equipment. Identified equipment alignment problems were verified by the inspectors to be properly resolved.

The inspectors selected the following equipment trains to verify operability and proper equipment line-up for a total of three samples:

- 'B' Standby Diesel Generator (SBDG) and support systems with the 'A' SBDG out of service (OOS) for maintenance during the week ending April 8, 2006;
- 'A' train of the Control Rod Drive (CRD) system with the 'B' train of CRD OOS for maintenance during the week ending May 13, 2006; and
- 'B' train of the Core Spray and support systems prior to 'A' train testing of Core Spray during testing of both trains in the week ending May 20, 2006.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Fire Zone Walkdowns (71111.05Q)

a. Inspection Scope

The inspectors walked down ten risk-significant fire areas to assess fire protection requirements. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. Various fire areas were reviewed 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 had implemented adequate compensatory measures for out of service (OOS), degraded, or inoperable fire protection equipment, systems or features. Fire areas were selected based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events, their potential to adversely impact equipment which is used to mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Inspection activities included, but were not limited to, the control of transient combustibles and ignition sources, fire detection equipment, manual suppression capabilities, passive suppression capabilities, automatic suppression capabilities, compensatory measures, and barriers to fire propagation.

The inspectors selected the following areas for review for a total of 10 samples:

During the week ending April 15, 2006:

- Area Fire Plan (AFP) 29, Pumphouse Fire Pump and Fire Pump Day Tank Rooms.

During the week ending May 13, 2006:

- AFP 21, Turbine building North Turbine Operating Floor, and Middle Operating Floor;
- AFP 22, Turbine building South Turbine Operating Floor;
- AFP 26, Control building Control Room Complex; and
- AFP 27, Control building Control Room HVAC Room.

During the week ending June 3, 2006:

- AFP 4, Reactor building North Control Rod Drive (CRD) Module Area, and CRD Repair Room; and
- AFP 5, Reactor building South CRD Module Area, Off-Gas Recombiner Room, and Railroad Airlock.

During the week ending June 17, 2006:

- AFP 1, Reactor building Torus Area and North Corner Rooms; and
- AFP 2, Reactor building South Corner Rooms.

During the week ending June 30, 2006:

- AFP 74, Yard Transformer Switchyard Area.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

During the week ending June 17, 2006, the inspectors performed an annual review of flood protection barriers and procedures for coping with external flooding for a total of one sample. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. Inspection activities focused on verifying that flood mitigation plans and equipment were consistent with design requirements and risk analysis assumptions. Inspection activities included, but were not limited to, a review and/or walkdown to assess design measures, seals, drain systems, contingency equipment condition and availability of temporary equipment and barriers, performance and surveillance tests, procedural adequacy, and compensatory measures.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

During the week ending April 8, 2006, the inspectors performed an annual review of the licensee's bio-fouling and cleanliness inspection and associated Eddy Current testing of the 'A' standby diesel generator (SBDG) ESW supplied heat exchangers for a total of one sample. The inspectors utilized the documents listed in the Attachment to accomplish the objectives of the inspection procedure. The inspection focused on

potential deficiencies that could mask the licensee's ability to detect degraded performance, identification of any common cause issues that had the potential to increase risk, and ensuring that the licensee was adequately addressing problems that could result in initiating events that would cause an increase in risk. The inspection activities included, but were not limited to, a review of 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 criteria.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

a. Inspection Scope

During the week ending April 22, 2006, the inspectors observed a training crew performance on Simulator Exercise Guide (SEG) 2006B-04 for a total of one sample. The scenario included operator response to a tornado sighting within the Owner Controlled Area and the associated manual reactor SCRAM, and an Emergency Action Level (EAL) declaration due to damaged transmission lines onsite. Complications for the scenario included an Emergency Operating Procedure required plant cooldown to cold shutdown conditions due to river flood waters leaking through the High Pressure Coolant Injection (HPCI) room hatch. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. The inspection activities assessed the licensee's effectiveness in evaluating the requalification program, ensuring that licensed individuals operated the facility safely and within the conditions of their license, and evaluated licensed operators' mastery of high risk operator actions. Inspection activities included, but were not limited to, a review of high risk activities, emergency plan performance, incorporation of lessons learned, clarity and formality of communications, task prioritization, timeliness of actions, alarm response actions, control board operations, procedural adequacy and implementation, supervisory oversight, group dynamics, interpretations of technical specifications, simulator fidelity, and the licensee critique of performance.

The crew performance was compared to licensee management expectations and guidelines as presented in the following documents:

- Administrative Control Procedure (ACP) 110.1, "Conduct of Operations," Revision 4;
- ACP 101.01, "Procedure Use and Adherence," Revision 37; and
- ACP 101.2, "Verification Process and SELF/PEER Checking Practices," Revision 5.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed three systems to assess maintenance effectiveness. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. Maintenance activities were reviewed to assess maintenance effectiveness, including maintenance rule activities, work practices, and common cause issues. Inspection activities included, but were not limited to, the licensee's categorization of specific issues including evaluation of maintenance performance criteria, appropriate work practices, identification of common cause errors, extent of condition, and trending of key parameters. Additionally, the inspectors reviewed implementation of the Maintenance Rule (10 CFR 50.65) requirements, including a review of scoping, goal-setting, performance monitoring, short-term and long-term corrective actions, functional failure determinations associated with reviewed condition reports, and current equipment performance status.

The inspectors performed the following maintenance effectiveness reviews for a total of three samples:

- C An issue/problem-oriented review of the Feedwater and Condensate system was performed because it was designated as risk-significant under the Maintenance Rule and the system experienced a pressure boundary failure on a RFP pump casing, during the weeks ending May 6 and May 13, 2006;
- C An issue/problem-oriented review of the GE Model 540 Controllers was performed because they were designated as risk-significant under the Maintenance Rule and several safety related systems had experienced failures, during the weeks ending June 3 and June 10, 2006; and
- A function-oriented review of the RHRSW system, because it was designated as risk-significant under the Maintenance Rule, during the week ending June 17, 2006.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors reviewed the licensee's evaluation of plant risk, scheduling, and configuration control for a total of five samples. An evaluation of the performance of maintenance associated with planned and emergent work activities was completed by the inspectors to determine if they were adequately managed. In particular, the inspectors reviewed the program for conducting maintenance risk safety assessments and to ensure that the planning, assessment, and management of on-line risk was

adequate. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. Licensee actions taken in response to increased on-line risk were reviewed including the establishment of compensatory actions, minimizing activity duration, obtaining appropriate management approval, and informing appropriate plant staff. These activities were accomplished when on-line risk was increased due to maintenance on risk-significant structures, systems, and components (SSCs).

The following activities were reviewed for a total of five samples:

- Maintenance risk assessment for work planned during the weeks of April 8, April 22, May 20, June 3, and June 17, 2006.

b. Findings

Introduction: The inspectors identified a non-cited violation (NCV) of 10 CFR 50.65, "Maintenance Rule," for failing to adequately assess the risk with the SLCS being unavailable during testing. This resulted in an unrecognized increase in risk to a higher risk category.

Description: During a review of Work Week 9622, the inspectors noted that the quarterly surveillance procedure for the SLCS was scheduled and the task was not considered risk-significant. The licensee's assessed risk was at baseline for this evolution. The inspectors reviewed the procedure, and the basis for the no-change to risk was that the system was considered available. The surveillance procedure required several local plant evolutions which aligns the system to use demineralized water to test the pumps' performance. Both pumps are isolated from the tank which contains the borated solution, and the system is flushed to disposal drums with demineralized water using manual valves in the reactor building which are on two different levels (a flush valve and a drain valve). After the drain and flush, a test tank, which is filled with demineralized water, is placed in service using manual valves in the reactor building to control flow to test the pump. The inspectors reviewed the guidance against the NUMARC 93-01, "Industry Guideline For Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Section 11 (revised). There would be several valve manipulations locally that would be required prior to the SLCS being ready to inject into the plant from the borated water tank. The specific valves and pump actions and their sequence, which were required to be repositioned or operated, were not contained in the procedure. The PRA success criteria was determined to be around 4 minutes in the most time sensitive case. The inspectors were concerned that the time needed to provide the function may not be met during the surveillance for availability as described in Section 11 (revised), paragraph 11.3.2.7 of NUMARC 93-01.

The inspectors provided these concerns to the licensee and the licensee determined they would not run the test until the issue was resolved. CAP 042499 and CAP 042756 were written to address the issue. The licensee revised the procedure to insert detailed restoration steps, communication and dedicated operator requirements. Because the time requirements are very short, the licensee has conservatively re-written the procedure to call the SLCS inoperable and unavailable. The surveillance was

completed on June 21, 2006, within the required interval. The licensee is evaluating long-term whether the enhanced procedures would be acceptable for operability and availability.

Analysis: The inspectors determined that the procedure as written June 1, 2006, did not provide adequate actions to credit recovery pursuant to NUMARC 93-01 Section 11 (revised), a document endorsed by the NRC in Regulatory Guide 1.182, as part of Maintenance Rule implementation of 10 CFR 50.65. In addition, the procedure did not have the required guidelines to credit an operator for restoring the system pursuant to the operability requirements. The time requirement (around 4 minutes) for operator actions was so short that with the limited guidance in the procedure, it was unlikely the operators would have completed the actions in time.

Although the procedure was not implemented on June 1, 2006, the same procedure was performed December 1, 2005, and March 1, 2006, and previously in past quarters. The failure to perform an adequate risk assessment due to SLCS being unavailable in the past cycle was a performance deficiency which required further review; in addition, the failure to consider the SLCS inoperable also was a performance deficiency.

The performance deficiency related to SLCS unavailability was evaluated against the guidance contained in Appendix B, "Issue Dispositioning Screening," of IMC 0612, "Power Reactor Inspection Reports." In particular, the inspectors compared this finding to the findings identified in Appendix E, "Examples of Minor Issues," of IMC 0612 to determine whether the finding was minor. Example e, of Section 7 for Maintenance Rule (10 CFR 50.65(a)(4)) issues, is germane. The plant conditions were not consistent for the required availability assumed in the PRA analysis for the SLCS. The item was more than minor since removing SLCS from availability in the licensee's risk model resulted in a higher plant risk category (Yellow). In addition, using IMC 0612, Appendix B, "Issue Screening," Section 3, this finding was more than minor because the licensee failed to perform an adequate risk assessment for a risk-significant system being unavailable. Appendix K to IMC 0609, "Maintenance Risk Assessment and Risk Management Significance Determination Process," was used to complete the phase 1/phase 2 SDP. The Core Damage Frequency (actual) was above the site's yellow threshold at about  $3E-5$  per year, but the exposure time was low since the surveillance was only performed four times a year for about 6 hours each time. The Incremental Core Damage Probability Deficit was approximately  $6E-8$  ( $<1E-6$ ), and therefore the finding was of very low safety significance (Green).

Enforcement: The regulatory requirement for "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," 10 CFR 50.65(a)(4), states, in part, that the licensee shall assess and manage the increase in risk that may result from proposed maintenance activities. The licensee's guideline WPG-2, "Online Risk Management," implements the requirements of 10 CFR 50.65(a)(4) by requiring a risk assessment be performed prior to on-line maintenance activities. Contrary to the above, on December 1, 2005, and March 1, 2006, the licensee failed to recognize that scheduled

surveillance for the SLCS rendered the system unavailable. The procedure which controlled the system alignments was inadequate and would not have been successful in restoring the system to a functional status within the time frames of the PRA evaluation. Because this finding was of very low safety significance and had been entered into the licensee's corrective action program as CAP 042499, this violation is being treated as an NCV in accordance with Section VI.A.1 of the NRC Enforcement Policy and is identified as NCV 05000331/2006003-01: Failure to Perform an Adequate Risk Assessment. The licensee's corrective actions included revising the procedure to insert detailed restoration steps, communications and dedicated operator requirements, as well as requirements for declaring the system inoperable and unavailable during performance of the surveillance test.

1R14 Personnel Performance During Non-Routine Plant Evolutions and Events (71111.14)

a. Inspection Scope

The inspectors reviewed personnel performance during one preplanned non-routine evolution and one emergent planned non-routine evolution. A review of the planned evolutions, associated procedures, briefings, and contingency plans were observed or evaluated by the inspectors. The inspectors observed and reviewed records of operator performance during these evolutions. Reviews included, but were not limited to, operator logs, pre-job briefings, instrument recorder data, and procedures. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure.

The inspectors observed the following planned non-routine evolutions for a total of two samples:

- An emergent rapid power reduction to 55 percent reactor power to permit removal of the 'A' RFP from service and subsequent repair of a steam leak on the pump casing, during the week ending April 22, 2006; and
- Selected high risk evolutions of a pre-planned 6-week Spent Fuel Pool Cleanup project which included the material preparation, shipping cask packaging, and subsequent removal from the pool of activated expendable components, completed during the week ending May 27, 2006.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed five of the licensee's operability evaluations of degraded or non-conforming systems. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. Operability evaluations were reviewed that affected Mitigating Systems or Barrier Integrity

Cornerstones to ensure adequate justification for declaration of operability and that the component or system remained available. Inspection activities included, but were not limited to, a review of the technical adequacy of the evaluation against the Technical Specifications (TSs), UFSAR, and other design information; validation that appropriate compensatory measures, if needed, were taken; and comparison of each operability evaluation for consistency with the requirements of ACP-114.5, "Action Request System" and ACP-110.3, "Operability Determination."

The inspectors reviewed the following operability evaluations for a total of four samples:

- Operability (OPR) 000328, 'B' RHR Pump Seal Cooler, during the week ending May 6, 2006;
- OPR 000331, Barton Instrument Seismic Qualification, during the week ending May 13, 2006;
- OPR 000330, SSC Power Supply Fuses, during the week ending May 20, 2006; and
- OPR 000335, Ultimate Heat Sink Intake Structure River Water Level, during the week ending June 30, 2006.

b. Findings

No findings of significance were identified.

1R19 Post-Maintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed six post-maintenance testing (PMT) activities. The documents listed in the Attachment were used to accomplish the objectives of the inspection procedure. PMT procedures and activities were verified to be adequate to ensure system operability and functional capability. Inspection activities were selected based upon the SSCs ability to impact risk. Inspection activities included, but were not limited to, witnessing or reviewing the integration of testing activities, applicability of acceptance criteria, test equipment calibration and control, procedural use and compliance, control of temporary modifications or jumpers required for test performance, documentation of test data, system restoration, and evaluation of test data. Also, the inspectors verified that maintenance and PMT activities adequately ensured that the equipment met the licensing basis, TS, and UFSAR design requirements.

The inspectors selected the following PMT activities for review for a total of six samples:

- Corrective Work Order (CWO) A68629, Replace 'A' SBDG Exhaust Manifolds, Extension Pipes, and Four Barrel Assemblies, during the week ending April 8, 2006;
- Preventive Work Order (PWO) 1132997, Refurbish and Calibrate 1D15 Inverter Circuit Cards, during the week ending May 6, 2006;
- PWO 1123075, Rebuild CV6919B Operator and Replace PCV on 'B' Control Building Chiller, during the week ending May 13, 2006;

- CWO A72439/A71440, Replacement/Calibration of 'E' APRM Power Supply, during the week ending May 20, 2006;
- CWO A71857ZS, Screen Wash Pump 1P-112A Suction Isolation, during the week ending June 17, 2006; and
- CWO A73587, Replace Sump Pump and Associated Discharge Piping in Manhole 1MH111/2MH209, during the week ending June 30, 2006.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed six surveillance test activities. Inspection procedure objectives were accomplished as indicated by the documents listed in the Attachment to this inspection report. Surveillance testing activities were reviewed to assess operational readiness and ensure that risk-significant SSCs were capable of performing their intended safety function. Surveillance activities were selected based upon risk significance and the potential risk impact from an unidentified deficiency or performance degradation that a SSC could impose on the unit if the condition was left unresolved. Inspection activities included, but were not limited to, a review for preconditioning, integration of testing activities, applicability of acceptance criteria, test equipment calibration and control, procedural use, control of temporary modifications or jumpers required for test performance, documentation of test data, TS applicability, impact of testing relative to Performance Indicator reporting, and evaluation of test data.

The inspectors selected the following surveillance testing activities for review for a total of six samples:

- Surveillance Test Procedure (STP) 3.6.1.3-03, Main Steam Isolation Valve Trip/Closure Time Check, during in the week ending April 22, 2006;
- STP 3.5.1-02, Low Pressure Coolant Injection (LPCI) System Operability Tests, during the week ending April 29, 2006;
- STP 3.5.3-02, Reactor Core Isolation Cooling (RCIC) System Operability Test, during the week ending May 6, 2006;
- STP 3.3.6.1-11, Reactor LO LO Water Level and LO LO LO Water Level Channel Functional Test, during the week ending May 13, 2006;
- STP 3.5.1-03, Core Spray System Simulated Automatic Actuation, in the week ending May 20, 2006; and
- STP 3.5.1-05, HPCI Operability Test, during the week ending June 3, 2006.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope

The inspectors reviewed one temporary modification. The documents listed in the Attachment were used to accomplish the objectives of the inspection procedure. The temporary modification was reviewed to assess the modification's impact on the safety function of the associated systems. Inspection activities included, but were not limited to, a review of design documents, safety screening documents, UFSAR, and applicable TSs to determine that the temporary modification was consistent with modification documents, drawings, and procedures. Inspectors also reviewed the post-installation test results to confirm that tests were satisfactory and the actual impact of the temporary modification on the permanent system and interfacing systems were adequately verified.

The inspectors selected the following temporary modification for review for a total of one sample:

- Temporary Modification 06-004, Installation of Brass Sealing Washer for Stud #7 for the 'A' RFP, during the week ending April 22, 2006.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors completed screening reviews of revisions of the Duane Arnold Energy Center's radiological Emergency Plan, the Emergency Action Level Technical Bases document, Emergency Plan Implementing Procedure 1.1, and Emergency Action Level Forms (charts) 1 and 2. The aforementioned revisions were dated in late January through early February 2006. Screening reviews were performed to determine whether changes identified in any of these revisions may have reduced the effectiveness of the licensee's emergency planning, and to verify that emergency action level and definition changes associated with NRC Bulletin 2005-02 were adequately incorporated in these revisions. The screening reviews of these revisions do not constitute approval of the changes and, as such, the changes are subject to future NRC inspection to ensure that the emergency plan continues to meet NRC regulations.

These activities completed one inspection sample.

b. Findings

No findings of significance were identified.

1EP7 Force-On-Force (FOF) Exercise Evaluation (71114.07)

a. Inspection Scope

During the week ending April 29, 2006, the inspectors observed the Emergency Preparedness portions of FOF exercise drills performed for a total of one sample. The inspectors evaluated the licensee's ability to integrate security, plant operations, and emergency response actions during a terrorist event, and the adequacy of the post-drill performance critique to identify licensee weaknesses and deficiencies. The documents listed in the Attachment were used to accomplish the objectives of the inspection procedure. Inspection activities included, but were not limited to, an assessment of the classification of events, notifications to off-site agencies, protective action recommendation development, and drill critiques. Primary focus was placed on evaluating the licensee's critique of the operations-security interface and emergency response actions during the event. Observations were compared with the licensee's observations and corrective action program entries.

b. Findings

No findings of significance were identified.

**4. OTHER ACTIVITIES**

4OA2 Identification and Resolution of Problems (71152)

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

For inspections performed and documented 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 corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. Minor issues entered into the corrective action program as a result of the inspectors' observations are included in the attached list of documents reviewed. This inspection activity does not count as an annual sample.

b. Assessment and Observations

No findings of significance were identified.

.2 Review of Items Entered into the Corrective Action Program

As required by Inspection Procedure 71152, Identification and Resolution of Problems, and in order to help identify repetitive equipment failures or specific human performance issues for follow-up, the inspectors performed screening of all items entered into the

licensee's corrective action program. This was accomplished by reviewing the description of each new CAP and attending daily management review committee meetings. This inspection activity does not count as an annual sample.

.3 Semi-Annual Review to Identify Trends

a. Inspection Scope

As required by Inspection Procedure 71152, Identification and Resolution of Problems, the inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue, during the week ending June 24, 2006, for a total of one sample. The inspectors' review was focused on repetitive equipment and corrective maintenance issues but also considered the results of daily inspector CAP item screening discussed in Section 4OA2. The review also included issues documented outside the normal corrective action program in system health reports, corrective maintenance work orders, component and program status reports, site monthly key performance indicators, Nuclear Oversight assessments, site self-assessments, Department Roll-up Meeting (DRUM) results, and maintenance rule assessments. The inspectors' review nominally considered the 6-month period of January through June 2006, although some examples expanded beyond those dates when the scope of the trend warranted. The inspectors compared and contrasted their results with the results contained in the licensee's latest assessments. Corrective actions associated with a sample of the issues identified in the licensee's trend report were reviewed for adequacy. The inspectors also evaluated the trending requirements specified in ACP 114.5, Action Request System, and 10 CFR 50, Appendix B. Specific documents reviewed are listed in the Attachment.

b. Assessment and Observations

The licensee's oversight group noted in CAP 042561, written June 5, 2006, that CAP trending required to be performed in accordance with the Action Request System procedure (ACP 114.5) was not being completed for 46 percent of the CAPs reviewed in the May 2006 timeframe. ACP 114.5 requires that "At the first opportunity, upon completion of the evaluation activity, the CAP Liaison (or appropriate person) finalize the applicable trend coding in the parent CAP record." The oversight group noted that the failure to enter the trend data could impact the site's ability to trend issues. The site has corrective actions planned to better process, complete, and accurately trend data. The inspectors expressed concern that trending across the site may not be reliable. The inspectors also validated that trending had not been done on several occasions, although required for all adverse conditions. The performance deficiency was not more than minor, as the inspectors did not find any additional trends that were not already identified by the licensee.

.4 Annual Sample: Review of Operator Workarounds (OWAs)

a. Inspection Scope

The inspectors evaluated the licensee's implementation of their process which is 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 OWAs on the 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.

b. Assessment and Observations

During the week ending June 3, 2006, the inspectors performed a review of the cumulative effects of OWAs for a total of one sample. The documents listed in the Attachment were reviewed to accomplish the objectives of the inspection procedure. Operator workarounds were reviewed to identify any potential effect on the functionality of Mitigating Systems. Reviews were conducted to determine if the workarounds could increase the possibility of an Initiating Event, if the workaround was contrary to training, required a change from long standing operational practices, created the potential for inappropriate compensatory actions, impaired access to equipment, or required equipment uses for which the equipment was not designed. Additionally, 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 corrective action program and proposed or implemented appropriate and timely corrective actions which addressed each issue. 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.

No findings of significance were identified.

.5 Selected Issue Follow-up: Review of the Status of Human Performance Improvement Plan and Substantive Cross-Cutting Issue Corrective Actions

a. Inspection Scope

The inspectors selected the review of the licensee's implemented corrective actions and performance improvement efforts to address an open substantive cross-cutting issue in the area of human performance. The specific focus for the inspectors' review was the time period from July 1, 2005, through June 30, 2006, and counts as one annual sample.

The inspectors reviewed the licensee's comprehensive human performance improvement plan and related documents in detail, with the intent of determining whether or not the corrective actions addressed generic implications, and to verify that they were appropriately focused to correct the human performance problems. In reviewing the licensee's comprehensive human performance improvement plan and related documents, the inspectors considered the evaluation and disposition of

performance issues, evaluation and disposition of operability issues, and application of risk insights for prioritization of issues. The related documents reviewed included, but were not limited to, the licensee's Root Cause Evaluation (RCE) addressing the substantive cross-cutting issue in human performance, Nuclear Oversight quarterly site assessment reports for the past four quarters, results from a human performance INPO assist visit conducted during the week of June 5, 2006, as well as specific corrective action program entries involving human performance. The documents reviewed are listed in the Attachment.

b. Assessment and Observations

The licensee has had an open issue in human performance through two assessment periods. During the mid-cycle assessment for the July 2004 - June 2005 inspection program, the NRC staff identified a substantive cross-cutting issue in the area of human performance. The results of this assessment were provided to the licensee in August 2005, in the Duane Arnold Energy Center Mid-Cycle Performance Review letter. This issue remained open following the end-of-cycle assessment for the entire 2005 calendar year inspection program, the results of which were provided to the licensee in March 2006, in the Duane Arnold Energy Center End-of-Cycle Performance Review letter.

The inspectors previously conducted an inspection sample utilizing inspection procedure 71152, Problem Identification and Resolution Inspection, to assess licensee progress in addressing human performance deficiencies. That review focused on the period from July 1, 2005, through December 2, 2005, and an assessment of the trend in human performance issues. The inspectors determined that the effectiveness of the licensee's corrective actions for the human performance substantive cross-cutting issue was indeterminate, as evidenced by the continued occurrence of human performance events/issues at the station, and the fact that additional corrective actions were not scheduled for implementation until the 1<sup>st</sup> quarter of calendar year 2006, and the licensee acknowledged that sustained improvement in human performance had yet to be conclusively demonstrated. The licensee continued to revise and enhance their human performance improvement plan to address these issues.

For the focus period of the current inspection sample, July 1, 2005, through June 30, 2006, the inspectors identified three findings of very low safety significance (Green) where human performance was not adequate. In addition to the items above that met the threshold for being documented in an inspection report, the inspectors reviewed minor issues identified to have human performance as the primary or contributing cause during the focus period, in an effort to identify whether or not the trend in human performance issues was declining, improving, or steady. The inspectors found that the licensee has continued to give an appropriately high priority to the actions intended to address the substantive cross-cutting issue in human performance. The licensee conducted human performance training for all site personnel which emphasized an increased awareness of human performance fundamentals and the use of human performance tools, specific for each workgroup, including the management team. The training was conducted between March 7 and May 18, 2006. Improvement in the identification of human performance issues prior to the issues resulting in an error or event was evident in the decrease of both the number of events resulting in site or

department clock resets and the frequency of events between the 1<sup>st</sup> quarter and 2<sup>nd</sup> quarter of calendar year 2006. The licensee's comprehensive improvement plan has continued to be provided with routine and regular updates as new corrective action program data becomes available.

The inspectors concluded that the licensee has implemented corrective actions resulting from their RCE, and is identifying human performance issues at a lower threshold resulting in a decrease in the number of resulting errors and events. Additional monitoring will be required to assess whether the current trend in human performance is sustainable. The inspectors will continue to evaluate the licensee's efforts to improve human performance by reviewing the cumulative effect of their corrective actions.

#### 4OA3 Event Follow-up (71153)

##### .1 Follow-up Issue Review for Unresolved Item (URI) 05000331/2006002-03, Unplanned Inoperability of the High Pressure Coolant Injection Pump

On September 29, 2005, HPCI was declared inoperable following unsatisfactory venting results of the system injection piping. The licensee determined that a steam void has formed in the HPCI discharge piping adjacent to the normally closed outboard isolation valve MO-2312 valve disc due to thermal energy being conducted from the feedwater piping, back upstream through the injection valve disc, to the water on the pump side of the discharge line. The licensee contracted engineering services to perform an in-depth transient thermal hydraulic analysis and a piping finite element stress analysis to evaluate past operability and to verify the licensee's current operability determination of the HPCI system. The licensee has entered this issue into their corrective action program as CAP 038124. On March 30, 2006, the licensee provided the steam void formation and transient thermal hydraulic analyses to regional inspectors. The compensatory actions the licensee implemented, as well as the analysis reviews conducted to date, support the current operability determination for the HPCI system. However, a question remains open concerning past operability. During the week ending May 6, 2006, the inspectors conducted an independent review of selected documents provided by the licensee. The documents reviewed are listed in the Attachment. Although the results of the review clarified several open concerns, the past operability of the HPCI system remains an open issue, which will be further evaluated by regional inspectors with the issue resolution documented in a future inspection report.

##### .2 (Closed) Licensee Event Report (LER) 50-331/2006-001-00: "Inoperability of Control Building/Standby Gas Treatment System (CB/SBGT) Instrument Air Compressor 1K-4"

On March 5, 2006, with the plant operating at approximately 96 percent reactor power in Mode 1, the licensee identified that one CB/SBGT Instrument Air subsystem was and had been inoperable for a period of approximately 21 days, that both subsystems had been inoperable for a period of approximately 51 hours, that the associated TS limiting conditions for operations (LCOs) had not been entered, and that subsequently the required Completion Times for the LCOs had been exceeded. Specifically, during testing of the CB/SBGT Instrument Air compressor 1K-4 per STP 3.7.9-02, "CB/SBGT Instrument Air Compressors System Leakage and Capacity Test" on March 5, 2006, it was necessary to shutdown compressor 1K-4 due to overheating. On March 7, 2006,

the licensee determined that the valve stem and disc for the 1K-4 ESW Supply Header Isolation valve (V13-0141) had separated causing flow blockage and loss of cooling flow to the compressor. The licensee further determined that the valve disc and stem separation most probably occurred when V13-0141 was reopened on February 8, 2006, following use of the valve as an isolation boundary for maintenance purposes. A review of the licensee's electronic log entries indicated that a planned TS LCO 3.6.4.3 Condition A was entered, for the 'A' SBT subsystem inoperable, on February 27, 2006, and exited on March 1, 2006. This resulted in both SBT trains being inoperable for a period of approximately 51 hours, without the associated TS LCOs being entered, resulting in the required Completion Times for the LCOs being exceeded. The licensee evaluated this condition to be of very low safety significance due to relatively low importance of the compressors in mitigating core damage or preventing a significant radiological release to the environment since the plant's normal instrument air system contains redundant components and power supplies. Corrective actions taken by the licensee included replacement of V13-0141, performance of an extent of condition review to identified similar susceptible valves, flow testing of identified components to verify the valves were operable, and entering corrective action documents in the corrective action program to track replacement of the valves.

The LER was reviewed by the inspectors who determined that this finding was more than minor because the TS limits were exceeded when the LCOs were not entered and the allowable outage times were not met. This finding affects the Barrier Integrity Cornerstone and was evaluated as having a very low safety significance (Green) using IMC 0609, Appendix A, Attachment 1, "Significance Determination of Reactor Inspection Findings for At-Power Situations," since the finding only degrades Containment Barriers and only represents a degradation of the radiological barrier function provided for the SBT system. This licensee-identified finding involved a violation of TS 3.7.9, Control Building/Standby Gas Treatment System Instrument Air. The enforcement aspects of the violation are discussed in Section 4OA7. This LER is closed.

#### 4OA6 Meetings

##### .1 Exit Meeting

The inspectors presented the inspection results to Mr. J. Bjorseth and other members of licensee management on July 11, 2006. The licensee acknowledged the findings presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

##### .2 Interim Exit Meetings

Interim exits were conducted for:

Emergency Preparedness inspection with Mr. P. Sullivan on June 13, 2006.

#### 4OA7 Licensee-Identified Violations

The following violation of very low significance was identified by the licensee and is a violation of NRC requirements which meets the criteria of Section VI of the NRC Enforcement Manual, NUREG-1600, for being dispositioned as an NCV.

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

Technical Specification 3.7.9, Condition A, requires that, when one CB/SBGT Instrument Air subsystem is inoperable while in Modes 1, 2, and 3, the required features supported by the CB/SBGT Instrument Air subsystem be declared inoperable within 4 hours of discovery AND that the CB/SBGT Instrument Air subsystem be restored to an operable status within 7 days. Condition B requires that, when both CB/SBGT Instrument Air subsystems are inoperable while in Modes 1, 2, and 3, that the plant shall be placed in Mode 3 within 12 hours AND be placed in Mode 4 within 36 hours. Contrary to these requirements, the licensee discovered on March 7, 2006, that due to a failure of the air compressor cooling water manual supply valve, one subsystem had been inoperable for a period of approximately 21 days, and that both subsystems were inoperable for a period of approximately 51 hours, thereby exceeding the required Completion Times for both Condition A and Condition B. Since an actual demand was not imposed upon the SBGT system during the periods of inoperability and the finding represented only a degradation of the radiological barrier function provided for the SBGT system, this issue is of the very low safety significance. The licensee documented the issue in their corrective action program as CAP 040721.

ATTACHMENT: SUPPLEMENTAL INFORMATION

## SUPPLEMENTAL INFORMATION

### KEY POINTS OF CONTACT

#### Licensee

G. Van Middlesworth, Site Vice President  
J. Bjorseth, Site Director  
D. Curtland, Plant Manager  
S. Catron, Licensing Manager  
S. Haller, Site Engineering Director  
B. Kindred, Security Manager  
J. Morris, Training Manager  
G. Rushworth, Operations Manager  
G. Pry, Maintenance Manager  
J. Windschill, Chemistry & Radiation Protection Manager  
P. Sullivan, Emergency Preparedness Manager

#### Nuclear Regulatory Commission

D. Spaulding, Project Manager, NRR  
B. Burgess, Chief, Reactor Projects Branch 2

### LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened

05000331/2006003-01	NCV	Failure to Perform An Adequate Risk Assessment (Section 1R13)
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#### Closed

05000331/2006003-01	NCV	Failure to Perform An Adequate Risk Assessment (Section 1R13)
50-331/2006-001-00	LER	Inoperability of Control Building/Standby Gas Treatment System (CB/SBGT) Instrument Air Compressor 1K-4 (Section 4OA3)

#### Discussed

05000331/2006002-03	URI	Unplanned Inoperability of the High Pressure Coolant Injection Pump (Section 4OA3)
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## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspectors reviewed the documents in their entirety but rather that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

### 1R01 Adverse Weather

Integrated Plant Operating Instruction (IPOI) 6, Weather Impacted Operations, Revision 34  
Abnormal Operating Procedure (AOP) 903, High Winds/Severe Thunderstorm/Tornado, Revision 18  
Condition Evaluation (CE) 00906, Switchyard Storage Concerns, Revision 0  
CAP 042389, IPOI-6 Tornado Checklist Procedure Implementation Issue, May 24, 2006  
CAP 042390, IPOI 6 Tornado Missile hazard Walkdown, May 24, 2005  
CAP 036858, Control Of Missile hazards (Response to FIN 2005003-01), June 30, 2005  
Operating Instruction (OI) 711, Pumphouse HVAC System, Revision 9  
OI 711A1, Pumphouse HVAC Electrical Lineup, Revision 1  
OI 711A3, Pumphouse HVAC Control Panel Lineup, Revision 1

### 1R04 Equipment Alignment

OI 324A2, SBDG 1G-21 System Electrical Lineup, Revision 1  
OI 324A4, SBDG 1G-21 System Valve Lineup and Checklist, Revision 3  
OI 324A8, SBDG 1G-21 System Control Panel Lineup, Revision 0  
OI 255A2, CRD System Valve Lineup and Checklist, Revision 3  
OI 255A1, CRD System Electrical Lineup, Revision 1  
STP 3.5.1-03, Core Spray System Simulated Automatic Actuation, Revision 5  
OI 151, Core Spray System, Revision 49  
OI 151A2, 'A' Core Spray System Valve Lineup and Checklist, Revision 2

### 1R05 Fire Protection

AFP 29, Pump House Fire Pump and Fire Pump Day Tank Rooms, Revision 27  
AFP 21, Turbine Building North Turbine Operating Floor, Revision 24  
AFP 22, Turbine Building South Turbine Operating Floor, Revision 25  
AFP 26, Control Building Control Room Complex, Revision 31  
AFP 27, Control Building Control Room HVAC Room, Revision 25  
AFP 5, Reactor building South CRD Module Area, Off-Gas Recombiner Room, and Railway Airlock, Revision 26  
AFP 4, Reactor building North CRD Module Area, and CRD Repair Room, Revision 27  
AFP 1, Reactor Building Torus Area and North Corner Rooms, Revision 24  
AFP 2, Reactor Building South Corner Rooms, Revision 23  
AFP 74, Site Switchyard, Revision 4

1R06 Flood Protection Measures

Individual Plant Examination of External Events, External Flooding Analysis, Section 5.2,  
November 1995  
AOP 902, Flood, Revision 25

1R07 Heat Sink Performance

CAL-MK05-027, Emergency Diesel Generator Heat Exchanger Heat Transfer  
Calculation, Revision 4  
PWO 1133666, Perform Eddy Current Testing on the 'A' Diesel Generator Heat  
Exchangers, dated April 4, 2006  
PWO 1133667, Clean and Inspect. Install Plugs if Required per Eddy Current Testing  
Work and PWO 1133666, dated April 4, 2006

1R11 Licensed Operator Requalification Program

SEG 2006B-04, Tornado/Flooding-Emergency Operating Procedure (EOP) 3 Entry/Alert  
EAL  
EOP 3, Secondary Containment Control, Revision 18  
Alternate Level Control, Revision 4  
Emergency Depressurization, Revision 4  
EAL Table 1, Revision 7  
Emergency Plan Implementing Procedure 1.2, Notifications, Revision 33  
AOP 903, Tornado, Revision 15

1R12 Maintenance Effectiveness

Start Up System (SUS) 44.00, 45.01, 45.02, "Performance Criteria Basis Document for  
the Feedwater and Condensate System," Revision 0  
CAP 041865, Feedwater Maintenance Rule RED 50.65(a)(1) Declaration, dated  
April 27, 2006  
Maintenance Rule Evaluation (MRE) 000211, Feedwater Maintenance Rule RED  
50.65(a)(1) Declaration, dated April 28, 2006  
DAEC Maintenance Rule Program Expert Panel Meeting Minutes, NG-05-0369,  
July 1 2005  
CAP 036988, Maintenance Rule 50.65(a)(1) [Red] for GE Model 540 Controller  
Declared, July 1, 2005  
CAP Review GE540's July 1, 2004 to June 10, 2006  
CWO review GE540's July 1, 2005 to June 10, 2006  
Maintenance Rule Evaluation (MRE) MRE000208, GE Model 540 Controller, 8/4/2005  
DAEC Maintenance Rule Program Expert Panel Meeting Minutes, NG-05-0565,  
October 7, 2005  
CA040637, Replacement of GE Model 540 Controller, July 27, 2005  
MRE000207, Functional Failure Evaluation For FIC5828B, July 6, 2005  
DAEC LER 2005-002-00, Both Standby gas Treatment Trains Briefly Inoperable During  
testing, August 19, 2005  
Summary of DAEC Maintenance Rule System Goals for Red (a)(1) System,  
May 22, 2006

Maintenance Rule Performance Criteria Basis Document for Control Building heating  
 Ventilation and Air Conditioning system, Revision 5  
 Maintenance Rule Overview Module, Module 0, Revision 3  
 Maintenance Rule Program Performance Criteria Development, Module 3, Revision 3  
 Maintenance Rule Availability criteria, November 13, 2004  
 Maintenance Rule System Near Yellow or Red, March 6, 2006  
 Cap Search HPCI/RCIC controller failure, May 25, 2005  
 Open PWO and CWO for controllers as of May 25, 2006  
 DBD-E12-001, "Residual Heat Removal Service Water System Design Bases  
 Document," Revision 6  
 SUS 11.01, "Performance Criteria Basis Document for the General Service Water  
 System," Revision 1  
 SUS 16.00, "Performance Criteria Basis Document for the Residual Heat Removal  
 Service Water (RHRSW) System," Revision 4  
 SUS 49.00, "Performance Criteria Basis Document for the Residual Heat Removal  
 System," Revision 5  
 CAP 037637, "AV4926F Appeared to Have Vented Water," August 25, 2005  
 CAP 042713, "RHRSW Motor Oil Cooler Flow Velocity Exceeds Design Standards,"  
 June 13, 2006  
 CAP 037917, "RHR Heat Exchanger DP Observation During ESW STP with 2 RHR SW  
 Pumps Running," September 19, 2005  
 CAP 038388, "A Side RHRSW Flow Indicates Approximately 125 gpm with All Pumps  
 Off," October 14, 2005  
 CAP 037803, "High 'A' RHRSW Strainer DP When Running 'A' and 'C' RHRSW  
 Pumps," September 7, 2005  
 CAP 037878, "Conflicting Technical Input from Vendors on Source of Bryozoa in RHR  
 SW Strainers," September 13, 2005  
 CAP 037764, "Received ESW/RHRSW Hi Delta P Annunciator When Starting 'D'  
 RHRSW Pump," September 2, 2005  
 CAP 037802, "Hi 'B' RHRSW Strainer DP When Running ESW Operability STP  
 NS540002," September 7, 2005  
 CAP 039340, "Lack of Engineering Basis for Allowable Sand/Silt Level in ESW/RHRSW  
 Wet Pits," December 14, 2005.  
 CAP 042424, "Unplanned LCO entry, 1P022D INOP Due to Loss of Oil in Upper  
 Sight-glass," May 26, 2006  
 CAP 042186, "RHRSW System Design Creates Operator Burden," May 12, 2006  
 CAP 040336, "Potential for Unmonitored Release of RHRSW via Pumphouse Sump,"  
 February 11, 2006

1R13 Maintenance Risk Assessments and Emergent Work Control

Work Procedure Guidelines - 2, On-Line Risk Management Guideline, Revision 23  
 DAEC Online Schedule, Week 9613/9614, March 30, 2006  
 Maintenance Risk Evaluation for Week 14, March 30, 2006  
 DAEC Online Schedule, Week 9615/9616, April 13, 2006  
 Maintenance Risk Evaluation for Week 16, April 14, 2006  
 DAEC Online Schedule, Week 9619/9620, May 12, 2006  
 Maintenance Risk Evaluation for Week 20, May 12, 2006  
 DAEC Online Schedule, Week 9621/9622, May 26, 2006

Maintenance Risk Evaluation for Week 22, May 26, 2006  
DAEC Online Schedule, Week 9623/9624, June 8, 2006  
Maintenance Risk Evaluation for Week 24, June 9, 2006  
STP 3.1.7-01, SBLC Pump Operability Test, Revision 13  
CAP 042499, Evaluate SBLC Status Performing STP and Potential Procedure Improvements, June 1, 2006  
CE003933, Evaluate SBLC Status While Performing STP and Potential Procedure Improvements, Revision 0  
STP 3.1.7-01, SBLC Pump Operability Test, Revision 13 and Revision 15  
NEI 99-02, Revision 4  
CAP 042499, Evaluate SBLC Status While Performing STP and Potential Procedure Improvements, June 1, 2006  
CAP 042756, Past Unavailability of SBLC, June 16, 2006  
CAP 042729, Lack of Communication leads to halt of STP, June 14, 2006  
Document 1249309D-004 (Engineering Research, Inc.), DAEC Probabilistic Safety Assessment Human Reliability Analysis, Revision 4  
Project task report GE-NE-A22-00100-60-0, Anticipated Transient Without Scram, Revision 0

1R14 Personnel Performance During Non-Routine Plant Evolutions and Events

RCE000094, Leak Developed on the 1P001A1 #6 Bolt Which Caused the Plant to Reduce Power, dated July 21, 1995  
Refueling Procedure 607, Removal and Movement of Material Within the Spent Fuel Pool and Cask Pool, Revision 6

1R15 Operability Evaluations

ACP 110.3, Operability Determination, Revision 8  
ACP 114.5, Action Request System, Revision 49

1R19 Post-Maintenance Testing

Maintenance Directive-024, Post Maintenance Testing Program, Revision 39  
CE003024, A Screenwash Pump 1P112A-Suction Strainer Hi DP, September 26, 2005  
General Maintenance Procedure-Test-58, Air Operated Valve Diagnostics Testing, Revision 2

1R22 Surveillance Testing

STP 3.6.1.3-03, Main Steam Isolation Valve Trip/Closure Time Check, Revision 3  
STP 3.5.1-02, LPCI System Operability Test, Revision 20  
STP 3.5.3-02, RCIC System Operability Test, Revision 19  
STP 3.3.6.1-11, Reactor Lo Lo Water Level and Lo Lo Lo Water Level Channel Functional Test, Revision 5  
STP 3.5.1-03, Core Spray System Simulated Automatic Actuation, Revision 6  
STP 3.5.1-05, HPCI System Operability Test, Revision 28

#### 1R23 Temporary Plan Modifications

TM06-004, Installation of Brass Sealing Washer for Stud #7 for the 'A' RFP, dated April 19, 2006

CWO A71601, Install Brass Washer and Check Top Case Capnut Torques for 'A' RFP, dated April 19, 2006

CWO A55965, Plug Hole, Install Brass Washer and Check Top Case Capnut Torques for 'B' RFP, dated September 21, 2000

#### 1EP4 Emergency Action Level (EAL) and Emergency Plan Changes

Duane Arnold Energy Center Emergency Plan, Introduction, Revision 21

Duane Arnold Energy Center Emergency Plan, Sections A, C, J, and N, Revision 22

Duane Arnold Energy Center Emergency Plan, Section B, Revision 27

Duane Arnold Energy Center Emergency Plan, Sections D and H, Revision 24

Duane Arnold Energy Center Emergency Plan, Sections E, G, K, L, M, O, and P, Revision 21

Duane Arnold Energy Center Emergency Plan, Sections F and I, Revision 23

Duane Arnold Energy Center Emergency Plan, Appendix 1, Revision 20

Duane Arnold Energy Center Emergency Plan, Appendices 2 and 6, Revision 23

Duane Arnold Energy Center Emergency Plan, Appendices 4 and 5, Revision 21

Emergency Action Level Technical Bases Document, Sections EBD-REF, EBD-REG, and EBD-C, Revision 0

Emergency Action Level Technical Bases Document, Section EBD-E, Revision 1

Emergency Action Level Technical Bases Document, Section EBD-F, Revision 6

Emergency Action Level Technical Bases Document, Sections EBD-H and EBD-R, Revision 9

Emergency Action Level Technical Bases Document, Section EBD-S, Revision 7

Emergency Plan Implementing Procedure 1.1, Revision 26

Emergency Action Level Form 1, Revision 7

Emergency Action Level Form 2, Revision 6

#### 1EP7 Force-On-Force (FOF) Exercise Evaluation

AOP 914, Security Events, Revision 35

#### 4OA2 Identification and Resolution of Problems

ACP 114.4, Corrective Action Program, Revision 21

ACP 114.5, Action Request System, Revision 50

Daily CAP Screen package April - June 2006

Key Performances Indicators (KPI) for Corrective Actions, May 2006

KPI for Maintenance Avoidable Rework, May 2006

CAP 042561, Some CAPs not Trended IAW CTCM Resulting in Potentially Missed Performance Trend, June 5, 2006

1<sup>st</sup> Quarter DAEC Maintenance Department Roll-Up Meeting Results, April 21, 2006

1<sup>st</sup> Quarter DAEC Engineering Department Roll-Up Meeting Results, May 10, 2006

1<sup>st</sup> Quarter DAEC Radiation Protection Department Roll-Up Meeting Results, May 16, 2006

1<sup>st</sup> Quarter DAEC Training Department Roll-Up Meeting Results, April 21, 2006

1<sup>st</sup> Quarter DAEC Operations Department Roll-Up Meeting Results, no-date  
Rework Evaluation List, January 1 through June 22, 2006  
FPL Duane Arnold Nuclear Oversight Quality Report, PDA-06-002, June 7, 2006  
CAP 039570, Multiple Emergency Site Failure During Monthly Testing, Revision 0  
RCE000222, Silt levels in front of Intake Structure, July 18, 2002  
CAP 031578, traveling Screen and Screen Wash Operability Requirements,  
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CAP 030396, RWS Screen Wash Pumps Operability Effects on RWS Subsystem  
Operability, January 15, 2004  
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CAP 042883, Intake Structure Forebay Inspection Identified Significant Sand  
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CAP 042760, The Site DRUM Process Requires Enhancement, June 16, 2006  
CAP 042789, 1E201A Heat Exchanger Performance Test Required, June 18, 2006  
CAP 042761, RHRSW Pumps Discharger Strainer Plugged, June 17, 2006  
Self Assessment (SA) 007814, Predictive Maintenance Program, May 25, 2005  
SA006344, ISI Program, June 12, 2006  
Corrective Action 041901, Self Assessment on Risk Identification and Management,  
April 28, 2006  
SA041485, Industrial Safety, April 24, 2006  
ACP 1410.12, Operator Burden Program, Revision 8  
Operations Procedure-001, Operator Burden and Tagout (Section) Audit, Revision 36,  
dated April 17, 2006  
OWA 05-002, Turbine Steam Seal Main Steam Supply (CV-1175) Isolation,  
September 22, 2005  
Operator Challenge 05-001, 1P-5A/1P-5B Condensate Pump Operations, May 6, 2005  
Operator Challenge 05-003, Feedwater regulating valve controller programing  
uncertainties, May 30, 2005  
Operator Challenge 05-006, HPCI system Operable But Degraded requiring  
compensatory actions, October 12, 2005  
RCE 001035, Cross Cutting Finding in the Area of Human Performance,  
September 2, 2005

#### 4OA3 Event Follow-up

MPR-2880; Duane Arnold Energy Center Evaluation of HPCI Piping Voiding; Revision 0  
0078-0503-02; HPCI System Transient Thermal Hydraulic Analysis; Revision 2  
0078-0503-07; Supplemental SYSFLO Analyses without Steam Bubble; Revision 0  
LER 2006-001-00, Inoperability of Control Building/Standby Gas Treatment System  
(CB/SBGT) Instrument Air Compressor 1K-4, May 4, 2006

#### 4OA7 Licensee-Identified Violations

CAP 040721, 1K004 Compressor Overheats - Unplanned LCO, dated March 5, 2006

## LIST OF ACRONYMS USED

ACP	Administrative Control Procedure
AFP	Area Fire Plan
AOP	Abnormal Operating Procedure
CAP	Corrective Action Process
CB	Control Building
CFR	Code of Federal Regulations
CRD	Control Rod Drive
CWO	Corrective Work Order
DRP	Division of Reactor Projects
DRUM	Department Roll-up Meeting Results
EAL	Emergency Action Level
ESW	Essential Service Water
FOF	Force-On-Force
GE	General Electric
HPCI	High Pressure Core Injection
HVAC	Heating, Ventilation, and Air-Conditioning
IMC	Inspection Manual Chapter
IPOI	Integrated Plant Operating Instruction
IR	Inspection Report
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LPCI	Low Pressure Coolant Injection
NCV	Non-Cited Violation
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
OI	Operating Instruction
OOS	Out of service
OPR	Operability
OWA	Operator Workaround
PARS	Publicly Available Records
PMT	Post-Maintenance Testing
PRA	Probabilistic Risk Assessment
PWO	Preventive Work Order
RCE	Root Cause Evaluation
RCIC	Reactor Core Isolation Cooling
RFP	Reactor Feedwater Pump
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
SBDG	Standby Diesel Generator
SBGT	Standby Gas Treatment
SDP	Significance Determination Process
SEG	Simulator Exercise Guide
SLCS	Standby Liquid Control System
SSCs	Structures, Systems, and Components
STP	Surveillance Test Procedure
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item