

October 17, 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 05000331/2006004 (DRP); 05000331/2006015 (DRS)

Dear Mr. Van Middlesworth:

On September 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 October 3, 2006, with you and other members of your staff.

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

Based upon the results of this inspection, no findings of significance were identified.

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). ADAMS is 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 05000331/2006004; 05000331/2006015
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-331; 72-032

License No: DPR-49

Report No: 05000331/2006004; 05000331/2006015

Licensee: Florida Power and Light Energy Duane Arnold, LLC

Facility: Duane Arnold Energy Center

Location: Palo, Iowa

Dates: July 1 through September 30, 2006

Inspectors: R. Orlikowski, Senior Resident Inspector
R. Baker, Resident Inspector
S. Sheldon, Reactor Engineer
M. Phalen, Health Physicist
T. Ploski, Senior Emergency Preparedness Analyst
M. Bielby, Senior Operator Licensing Inspector
C. Zoia, Operator Licensing Inspector
M. Gryglak, Materials Inspector

Observers: None

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

Enclosure

SUMMARY OF FINDINGS

IR 05000331/2006004; 05000331/2006015; 07/01/2006 - 09/30/2006; Duane Arnold Energy Center. Routine Integrated Inspection Report.

This report covers a 3-month period of baseline resident inspection and announced baseline inspections of radiation protection, operating licensing, and emergency preparedness. The inspections were conducted by Region III reactor inspectors, operating licensing inspectors, a regional emergency preparedness inspector, a regional radiation specialist, 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

None.

B. Licensee-Identified Violations

None.

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 September 23, 2006, with the plant operating at full power, the 'B' Recirculation Pump Motor Generator Set tripped off-line due to a failure in the motor generator field control circuit. The operators performed the required actions for single loop operation, and stabilized the plant at approximately 52 percent power. The plant was returned to full power on September 25, 2006, following the repair, post maintenance testing, and restoration of the 'B' Recirculation Pump Motor Generator Set.

1. REACTOR SAFETY

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

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. Systems were selected by the inspectors during times when the trains were of increased importance due to the redundant trains or 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:

- High Pressure Coolant Injection (HPCI) system with the Reactor Core Isolation Cooling (RCIC) out of service (OOS) for maintenance;
- 'B' Emergency Service Water (ESW) system with the 'A' ESW system OOS for maintenance; and
- 'B' Control Building (CB) Chiller system with the 'A' CB Chiller system OOS for maintenance.

b. Findings

No findings of significance were identified.

.2 Complete Walkdown

a. Inspection Scope

The inspectors performed a complete system alignment inspection of the Residual Heat Removal (RHR) System for a total of one sample. This system was selected because it was considered risk-significant in the licensee's probabilistic risk assessment. The inspection consisted of the following activities:

- a review of plant procedures (including selected abnormal and emergency procedures), drawings, and the Updated Final Safety Analysis Report (UFSAR) to identify proper system alignment;
- a review of outstanding or completed temporary and permanent modifications to the system; and
- an electrical and mechanical walkdown of the system to verify proper alignment, component accessibility, availability, and current condition.

The inspectors also reviewed selected issues documented as Corrective Action Process (CAP) records, initiated within the previous year, to determine if they had been properly addressed in the licensee's corrective action program. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure.

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 nine 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 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 nine samples:

- Area Fire Plan (AFP) 07, RB Laydown Area, Corridor and Waste Tank Area, and Spent Resin Tank Room;
- AFP 10, Reactor Building (RB) Main Exhaust Fan Room, Heating Hot Water Pump Room, and Plant Air Supply Fan Room;
- AFP 12, RB Decay Tank and Condensate Phase Separator Room;
- AFP 13, RB Refueling Floor;
- AFP 25, Control Building (CB) Cable Spreading Room;
- AFP 69, Main Transformer 1X1;
- AFP 70, Standby Transformer 1X4;
- AFP 71, Startup Transformer 1X3; and
- AFP 72, Auxiliary Transformer 1X2.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

The inspectors performed a semi-annual review of flood protection barriers and procedures for coping with internal flooding in the Northwest Corner Room area for a total of one sample. The Northwest Corner Room was selected since it contains the “B” Residual Heat Removal (RHR) pump, the “D” RHR pump, and the “B” Core Spray pump. 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.

1R11 Licensed Operator Requalification Program (71111.11)

.1 Resident Inspector Quarterly Review

a. Inspection Scope

The inspectors observed two training crew performances on Examination Simulator Guide (ESG) 71, Revision 2, and ESG 73, Revision 1, for a total of one sample. The scenarios included operator response to a reactor feedwater pump trip at high power requiring a manual reactor scram with an accompanying electrical Anticipated Transient Without Scram, and high condenser backpressure requiring a manual reactor scram with an accompanying hydraulic Anticipated Transient Without Scram. Complications for the scenarios included a loss of annunciator power and a bellows failure on a safety relief valve. 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 39; and
- ACP 101.2, "Verification Process and SELF/PEER Checking Practices," Revision 5.

b. Findings

No findings of significance were identified.

.2 Facility Operating History

a. Inspection Scope

The inspectors reviewed the plant's operating history from August 2004 through August 2006 to identify operating experience that was expected to be addressed by the Licensed Operator Requalification Training (LORT) program. It was then verified that the identified operating experience had been addressed by the facility licensee in accordance with the station's approved Systems Approach to Training (SAT) program to satisfy the requirements of 10 CFR 55.59 (c), "Requalification program requirements."

b. Findings

No findings of significance were identified.

.3 Licensee Requalification Examinations

a. Inspection Scope

The inspectors performed a biennial inspection of the licensee's LORT test/examination program for compliance with the station's SAT program which would satisfy the requirements of 10 CFR 55.59 (c)(4), "Evaluation." The operating examination material reviewed consisted of four operating tests, each containing two dynamic simulator scenarios, and six job performance measures (JPMs). The inspectors reviewed the annual requalification operating test material to evaluate general quality, construction, and difficulty level. The inspectors assessed the level of examination material duplication from week-to-week during the current year operating test. The inspectors reviewed the methodology for developing the examinations, including the LORT program 2-year sample plan, probabilistic risk assessment insights, previously identified operator performance deficiencies, and plant modifications.

b. Findings

No findings of significance were identified.

.4 Licensee Administration of Requalification Examinations

a. Inspection Scope

The inspectors observed the administration of a requalification operating test to assess the licensee's effectiveness in conducting the test to ensure compliance with 10 CFR 55.59 (c)(4), "Evaluation." The inspectors evaluated the performance of one crew in parallel with the facility evaluators during two dynamic simulator scenarios and evaluated various licensed crew members concurrently with facility evaluators during the administration of several JPMs. The inspectors assessed the facility evaluators' ability to determine adequate crew and individual performance using objective, measurable standards. The inspectors observed the training staff personnel administer, the operating test, including conducting pre-examination briefings, evaluations of operator performance, and individual and crew evaluations upon completion of the operating test. The inspectors evaluated the ability of the simulator to support the examinations. A specific evaluation of simulator performance was conducted and documented under Section 1R11.8, "Conformance With Simulator Requirements," of this report.

b. Findings

No findings of significance were identified.

.5 Examination Security

a. Inspection Scope

The inspectors observed and reviewed the licensee's overall licensed operator requalification examination security program related to examination physical security (e.g., access restrictions and simulator considerations) and integrity (e.g., predictability and bias) to verify compliance with 10 CFR 55.49, "Integrity of examinations and tests." The inspectors also reviewed the facility licensee's examination security procedure, any corrective actions related to past or present examination security problems at the facility, and the implementation of security and integrity measures (e.g., security agreements, sampling criteria, bank use, and test item repetition) throughout the examination process.

b. Findings

No findings of significance were identified.

.6 Licensee Training Feedback System

a. Inspection Scope

The inspectors assessed the methods and effectiveness of the licensee's processes for revising and maintaining its LORT Program up to date, including the use of feedback from plant events and industry experience information. The inspectors reviewed the licensee's quality assurance oversight activities, including licensee training department self-assessment reports. The inspectors evaluated the licensee's ability to assess the effectiveness of its LORT program and their ability to implement appropriate corrective actions. This evaluation was performed to verify compliance with 10 CFR 55.59 (c) "Requalification program requirements" and the licensee's SAT program.

b. Findings

No findings of significance were identified.

.7 Licensee Remedial Training Program

a. Inspection Scope

The inspectors assessed the adequacy and effectiveness of the remedial training conducted since the previous biennial requalification examinations and the training from the current examination cycle to ensure that they addressed weaknesses in licensed operator or crew performance identified during training and plant operations. The inspectors reviewed remedial training procedures and individual remedial training plans. This evaluation was performed in accordance with 10 CFR 55.59 (c) "Requalification program requirements" and with respect to the licensee's SAT program.

b. Findings

No findings of significance were identified.

.8 Conformance With Operator License Conditions

a. Inspection Scope

The inspectors reviewed the facility and individual operator licensees' conformance with the requirements of 10 CFR Part 55. The inspectors reviewed the facility licensee's program for maintaining active operator licenses and to assess compliance with 10 CFR 55.53 (e) and (f). The inspectors reviewed the procedural guidance and the process for tracking on-shift hours for licensed operators and which control room positions were granted watch-standing credit for maintaining active operator licenses. The inspectors reviewed the facility licensee's LORT program to assess compliance with the requalification program requirements as described by 10 CFR 55.59 (c). Additionally, medical records for seven licensed operators were reviewed for compliance with 10 CFR 55.53 (I).

b. Findings

No findings of significance were identified.

.9 Conformance With Simulator Requirements

a. Inspection Scope

The inspectors assessed the adequacy of the licensee's simulation facility (simulator) for use in operator licensing examinations and for satisfying experience requirements as prescribed in 10 CFR 55.46, "Simulation Facilities." The inspectors also reviewed a sample of simulator performance test records (i.e., transient tests, malfunction tests, steady state tests, and core performance tests), simulator discrepancies, and the process for ensuring continued assurance of simulator fidelity in accordance with 10 CFR 55.46. The inspectors reviewed and evaluated the discrepancy process to ensure that simulator fidelity was maintained. Open simulator discrepancies were reviewed for importance relative to the impact on 10 CFR 55.45 and 55.59 operator actions as well as on nuclear and thermal hydraulic operating characteristics. The inspectors conducted interviews with members of the licensee's simulator staff about the configuration control process and completed the IP 71111.11, Appendix C, checklist to evaluate whether or not the licensee's plant-referenced simulator was operating adequately as required by 10 CFR 55.46 (c) and (d).

b. Findings

Introduction: The inspectors identified that the licensee appeared to be in violation of 10 CFR 55.46 (d)(1).

Description: In accordance with 10 CFR 55.46 (d)(1) a licensee shall conduct performance testing throughout the life of the simulation facility in a manner sufficient to ensure simulator fidelity has been demonstrated so that significant control manipulations are completed without procedural exceptions, simulator performance exceptions, or deviation from the approved training scenario sequence. The American National Standard Institute/American Nuclear Society (ANSI/ANS)-3.5-1983 standard, Section 3.1.2, identifies a list of 25 plant malfunction events that the simulator shall be capable of simulating. Regulatory Guide 1.149, Revision 1, Section C.5, states that malfunctions listed in ANSI/ANS-3.5-1983, Section 3.1.2, should be periodically tested not less than every 4 years. Section 5.4.1 also states that testing shall be conducted and a report prepared for each of the following occasions:

- (1) Completion of initial construction; and
- (2) If simulator design changes result in significant simulator configuration or performance variations.

Furthermore, Section 5.4.1 also states that when a limited change is made, a specific performance test on the affected systems and components shall be made. The licensee stated they conducted initial performance testing, but not periodic testing, on other malfunctions created in addition to the 25 listed under Section 3.1.2. The NRC was concerned because the licensee had difficulty retrieving documentation to support testing that had been performed.

Analysis: There currently is no safety consequence associated with not conducting periodic testing of the additional malfunctions. However, there is a regulatory issue of how simulator fidelity is assured in accordance with 10 CFR 55.46 (d)(1) if all malfunctions are not required to be tested on some periodicity or under conditions such as modifications or prior to licensed operator annual operating examinations.

Enforcement: The question as to whether malfunctions in addition to the 25 listed in Section 3.1.2 of ANSI/ANS-3.5-1983 have to be periodically performance tested to ensure simulator fidelity is an unresolved item pending further NRC review.
(URI 05000331/2006004-01)

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors reviewed two 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 two samples:

- An issue/problem-oriented review of the 480 VAC distribution system was performed because it had recently transitioned from green to yellow status; and
- An issue/problem-oriented review of the River Water Supply system was performed because it was designated as risk-significant under the Maintenance Rule and recently transitioned from green to yellow status due to sand accumulation in front of the intake structure and in the fore-bay.

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 July 8, July 15, July 29, September 2, and September 16.

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors reviewed personnel performance during one sequence of planned non-routine evolutions. A review of the planned evolutions, associated procedures, briefings, and contingency plans were observed and 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 sequence of planned non-routine evolutions for a total of one sample:

- Planned downpower evolutions which included performance of a control rod sequence exchange, quarterly operator walkdowns of the feedwater heater and condensate bays, quarterly main turbine surveillance test procedures (STPs), and emergent repair of the steam tunnel air lock outer door.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed four 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 administrative control procedure (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 Recommendation (OPR) 000336, Extent of Condition for the 'B' and 'C' RHR Service Water (RHRSW) Pumps;
- OPR 000338, RCIC Turbine Hydraulic Actuator-EGR-Null Voltage Out of Tolerance During Preventive Maintenance;
- OPR 000340, Standby Flow Units (SFUs) Indicate Flow While Shutdown; and
- OPR 000341, Pipe Flanges Are Not Accounted for in the Piping Analysis for V29-0005 ('B' River Water Supply pump discharge check valve).

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) A79240, Replace 'A' RHRSW Pump Motor Upper Bearing Cooling Coil;
- CWO A74692, Tune FIC7320A ('A' SFU flow controller) for Proper Response;
- CWO A70883, Install Standoffs on (terminals) AA-75 and AA-76 in 1C-41 & 1C-42;
- CWO A70272, Replace Manual Rod Movement Control Switch;
- Preventive Work Order (PWO) 1136402, Install Bryozoa Growth Monitoring Device in Pumphouse Stilling Basin; and
- PWO 1136920, 1B91 Motor Control Center Molded Case Circuit Breaker Testing.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed five 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 five samples:

- STP 3.1.7-03, Standby Liquid Control System Boron Concentration Test (routine);
- STP 3.5.1-04, Low Pressure Coolant Injection Subsystem Simulated Automatic Actuation (routine);
- STP 3.5.3-02, RCIC System Operability Test (inservice test-pump);
- STP 3.6.1.1-12 Containment Isolation Valve Leak Tightness Test-Type C- Containment Atmosphere Valves (inservice test-primary containment isolation valve); and
- STP 3.3.3.2-09, Reactor Water Level And Pressure Instruments Calibration (routine).

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 to the following portions of the Duane Arnold Energy Center's Emergency Plan to determine whether changes identified in these revisions may have reduced the effectiveness of the licensee's emergency planning: Section D, Revision 25; Appendix 5, Revision 22; and Appendix 6, Revision 24. 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.

1EP6 Drill Evaluation (71114.06)

.1 Simulator Based Training Evolution and Drill Scenario

a. Inspection Scope

On September 20, 2006, the inspectors observed an Emergency Preparedness (EP) drill for a total of one sample. The drill simulated an inadvertent HPCI auto injection which caused a power increase that stressed the fuel cladding. A subsequent main condenser tube failure and scram caused further pressure and temperature transients on the fuel. The scenario was further complicated by a break in the recirculation line that caused further pressure and temperature transients that perforated the fuel. A turbine building steam line then broke downstream of a main steam isolation valve that failed to isolate and resulted in an offsite release.

Inspectors evaluated the licensee's drill conduct and the adequacy of the post-drill performance critique to identify 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, the classification of events, notifications to off-site agencies, protective action recommendation development, and drill critiques. Observations were compared with the licensee's observations and corrective action program entries. Inspectors verified that there were no discrepancies between observed performance and reported PI statistics.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

2OS3 Radiation Monitoring Instrumentation and Protective Equipment (71121.03)

.1 Inspection Planning

a. Inspection Scope

The inspector reviewed the Duane Arnold Energy Center to identify applicable radiation monitors associated with measuring transient high and very high radiation areas including those used in remote emergency assessment. The inspector identified the types of portable radiation detection instrumentation used for job coverage of high radiation area work including instruments used for underwater surveys, fixed area radiation monitors used to provide radiological information in various plant areas, and continuous air monitors used to assess airborne radiological conditions, and work areas with the potential for workers to receive a 50 millirem or greater committed effective dose equivalent. Contamination monitors, whole body counters, and those radiation detection instruments utilized for the release of personnel and equipment from the radiologically controlled area were also identified.

These reviews represented two inspection samples.

b. Findings

No findings of significance were identified.

.2 Walkdowns of Radiation Monitoring Instrumentation

a. Inspection Scope

The inspector conducted walkdowns of selected area radiation monitors in the Reactor Building, Turbine Building, and the Rad Waste Building, to verify that they were located as described in the UFSAR and were adequately positioned relative to the potential source(s) of radiation they were intended to monitor. Walkdowns were also conducted of those areas where portable survey instruments were calibrated/repared and maintained for radiation protection staff use to determine if those instruments designated "ready for use" were sufficient in number to support the radiation protection program, had current calibration stickers, were operable, and were in adequate physical condition. Additionally, the inspector observed the licensee's instrument calibration units and the radiation sources used for instrument checks to assess their material condition and discussed their use with radiation protection staff to determine if they were used appropriately. Licensee personnel demonstrated the methods for performing source checks of portable survey instruments and for source checking personnel contamination and portal monitors used at the egress to the RCA.

These reviews represented one inspection sample.

b. Findings

No findings of significance were identified.

.3 Calibration and Testing of Radiation Monitoring Instrumentation

a. Inspection Scope

Licensee personnel were observed performing source checks of selected instruments. This included observing detector evaluation with check sources to determine if station requirements were met. The inspector reviewed records of calibration, operability, and alarm setpoints of selected instruments and personnel monitoring devices. This review included, but was not limited to the following:

- Certificate of Calibration for MGP-DMC Electronic Alarming Dosimeters;
- Certificate of Calibration for MGP Telepoles;
- Certificate of Calibration for National Nuclear Corporation ITM-2 Tool Monitors;
- Certificate of Calibration for MGP AMP-100s;
- High Range Containment Radiation Monitor; and
- Auxiliary Building Vent Stack Wide Range Gas Radiation Monitor.

The inspector evaluated those actions that would be taken when, during calibration or source checks, an instrument was found to be out of calibration by more than 50 percent. Those actions included an investigation of the instruments' previous usage, and the possible consequences of that, since the last calibration or source check. The inspector also reviewed the licensee's 10 CFR Part 61 source term analyses to determine if the calibration sources used were representative of the plant source term. This review represented one sample.

b. Findings

No findings of significance were identified.

.4 Problem Identification and Resolution

a. Inspection Scope

The inspector reviewed the licensee's self-assessments, audits, and condition reports that involved personnel contamination monitor alarms due to personnel internal exposures to determine if identified problems were entered into the corrective action program for resolution. There were no internal exposure occurrences greater than 50 millirem committed effective dose equivalent that were evaluated during the inspection. However, the licensee's process for investigating this type of occurrence was reviewed to determine if the affected personnel would be properly monitored utilizing the appropriate equipment and if the data would be analyzed and internal exposures properly assessed, in accordance with licensee procedures. This review represented one sample.

The inspector reviewed corrective action program reports related to exposure of significant radiological incidents that involved radiation monitoring instrument deficiencies since the last inspection in this area. Staff members were interviewed and corrective action documents were reviewed to determine if follow-up activities were being conducted in an effective and timely manner commensurate with its importance to safety and risk based on the following:

- Initial problem identification, characterization, and tracking;
- Disposition of operability/reportability issues;
- Evaluation of safety significance/risk and priority for resolution;
- Identification of repetitive problems;

- Identification of contributing causes;
- Identification and implementation of effective corrective actions; and
- Implementation/consideration of risk significant operational experience feedback.

This review represented one sample.

The inspector evaluated the licensee's self-assessment activities to determine if they would identify and address repetitive deficiencies or significant individual deficiencies observed in problem identification and resolution. This review represented one sample.

b. Findings

No findings of significance were identified.

.5 Radiation Protection Technician Instrument Use

a. Inspection Scope

The inspector determined if the calibration expiration and source response check data records on radiation detection instruments staged for use were current and observed radiation protection technicians for appropriate instrument selection and self-verification of instrument operability prior to use. This review represented one sample.

b. Findings

No findings of significance were identified.

.6 Self-Contained Breathing Apparatus (SCBA) Maintenance/Inspection and User Training

a. Inspection Scope

The inspector reviewed the status, maintenance and surveillance records of selected SCBA staged and ready for use in the plant, and assessed the licensee's capability for refilling and transporting SCBA air bottles to and from the control room during emergency conditions. The inspector determined whether control room operators and other emergency response and radiation protection personnel were trained and qualified in the use of SCBA, including personal bottle change-out. The inspector also reviewed the training and qualification records for selected individuals on each control room shift crew and selected individuals from each designated department that were currently assigned emergency duties including onsite search and rescue. This review represented one sample.

The inspector reviewed the SCBA manufacturer's maintenance training certifications for licensee personnel qualified to perform SCBA maintenance on vital components (regulator

and low pressure alarm). The inspector reviewed maintenance records for several SCBA designated as “ready for service.” The inspector verified that maintenance was performed by qualified personnel. The inspector also determined if the required periodic air cylinder hydrostatic testing was current and documented and if the licensee’s maintenance procedures were based on the SCBA manufacturer’s maintenance manuals. This review represented one sample.

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. Findings

No findings of significance were identified.

.2 Review of Items Entered into the Corrective Action Program

a. Inspection Scope

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 document and attending daily management review committee meetings. This inspection activity does not count as an annual sample.

b. Findings

No findings of significance were identified.

.3 Annual Sample - Selected Issue Follow-up: Review of “Root Cause Analysis of RHRSW Pump Motor Cooler Inoperabilities” (Root Cause Evaluation (RCE)-1053)

a. Inspection Scope

The inspectors evaluated the quality of the licensee's RCE which addressed the common mode failure of the RHRSW pump motor upper bearing oil reservoir cooling coils, based on the nuclear safety significance of the issue. The inspectors reviewed the completed product for compliance with the licensee's administrative control procedures, specifically to assess proper extent of condition review, causal factor determination, and development of corrective actions to prevent recurrence. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. This counts as one annual sample.

b. Assessment and Observations

The inspectors reviewed both of the failure analysis reports produced by the Florida Power and Light Research and Evaluation Laboratory for the four RHRSW pump motor cooling coils. The pinhole leaks in the cooling coils for the 'A' and 'D' RHRSW pump motor cooling coils, as well as the excessive wall thinning noted on the 'B' and 'C' RHRSW pump motor cooling coils were caused by erosion-corrosion due to turbulent flow induced by the 90-degree elbow fitting directly upstream from the inlet, coupled with an excessive flow rate of approximately 19 feet/second. Based on this information, the inspectors evaluated the licensee's root cause extent of condition assessment and verified that all susceptible plant components were either previously evaluated or included in this assessment.

The inspectors reviewed the identified causal factors which allowed the high cooling water flow condition to develop. The licensee's procedures and process for performing effective RCEs has improved significantly since the adverse condition was created by procedural changes implemented in 1995 and 1998. The current licensee's corrective action program has also matured in the areas of problem identification and resolution. The inspectors evaluated the licensee's causal factors and identified corrective actions to prevent recurrence, as outlined in this RCE, and did not identify any significant deficiencies.

The inspectors did identify one deficiency area of timeliness for performing RCEs. The licensee's procedures document an expectation that RCEs should be completed and approved by the management sponsor within 30 days. The inspectors noted that although this RCE was approved by the management sponsor within 30 days, subsequent Performance Assessment Review Board approval was delayed and revisions to the RCE required so that the final approved version required 53 days. The licensee has revised their Action Request System procedure to require Review Board approval of the completed RCE within the 30 day timeliness requirement.

No findings of significance were identified.

.4 Annual Sample - Selected Issue Follow-up: Documentation and Evaluation of Site Personnel Contamination Events (PCEs)

a. Inspection Scope

The inspectors reviewed the licensee's site PCEs and related documentation to evaluate whether a proper extent of cause was conducted, if corrective actions addressed identified causal factors, and if corrective actions were appropriately focused to correct any human performance problems. Additionally the inspectors reviewed the bases for the licensee's established goals and required actions for the number of site personnel contaminations. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. The specific focus for the inspectors' review was the time period from January 1, 2006, through September 30, 2006, and this review counts as one annual sample.

b. Assessment and Observations

The inspectors performed a detailed review of the licensee's documentation for site PCEs during the sample time period. In January 2006, over a 7 day period, 4 PCEs occurred in clean areas within the RB. The licensee performed detailed contamination surveys in the RB and identified seven areas where contamination levels exceeded station clean area limits. These areas were decontaminated to below clean area limits and a Condition Evaluation (CE) was performed to identify potential common cause issues. The CE noted that three of the four PCEs occurred in areas that had been previously posted as contaminated work areas and then decontaminated within the past 18 months. Corrective actions from the CE revised the Health Physics procedures to include potential contamination limits for contaminated work area surveys and require the addition of work area decontamination requirements prior to release surveys being conducted if these limits are exceeded. The inspectors reviewed this evaluation and did not identify any significant issues.

During the second calendar quarter of this year, the licensee completed a 12 week Spent Fuel Pool Cleanup Project in preparation for the upcoming refueling outage and new fuel receipts. The inspectors reviewed the licensee's(CE) for seven PCEs which occurred during the final 2 weeks of the project. The CE identified inadequate contamination control during the de-mobilization of the Spent Fuel Pool Cleanup Project had allowed discrete radioactive particles to migrate to the lower levels of the RB while the floor-plugs on the refuel floor were removed prior to equipment lifts. Of the seven PCEs identified, six PCEs were attributed directly to the project. These six PCEs are only reflected on the Radiation Protection department indicator and are not counted towards the site key performance indicator. The inspectors did not identify any significant discrepancies with this evaluation.

The bases for the licensee's PCE rate goal is 24 PCEs per year during non-refueling outage periods, tracked on a monthly rate of 2 PCEs per month. The licensee generates an action request in the corrective action program to perform a CE if the monthly rate is exceeded. On both occasions when the monthly rate was exceeded, the licensee completed a CE to assess potential human performance causal factors and contamination control discrepancies. The inspectors reviewed the corrective actions from the licensee's evaluations and did not identify any significant discrepancies.

No findings of significance were identified.

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

.1 Review of Personnel Performance During Non-Routine Planned Power Uprate Testing

a. Inspection Scope

The inspectors reviewed personnel performance during non-routine planned power uprate testing from 1840 MW thermal to 1860 MW thermal. A review of special test procedures, expert panel meetings, and briefings were performed by the inspectors. The inspectors also observed the operators performing plant manipulations to raise reactor power to 1860 MW thermal and the plant's operation at the increased power level. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. This review represented one sample.

b. Findings

No findings of significance were identified.

.2 Review of Personnel Performance During Non-Routine Planned Evolution: HPCI Keep Fill Test

a. Inspection Scope

The inspectors reviewed personnel performance during a non-routine planned evolution for a special test conducted to determine the necessary pressure required during normal operating conditions to eliminate steam void formation upstream of the HPCI feedwater injection isolation valve, MO-2312, within the horizontal 12" piping adjacent to the valve disc. A review of the special test procedure, PMT and operability requirements, and readiness review and challenge board meetings were performed by the inspectors. The inspectors also observed the pre-job briefings, test equipment acceptance and calibration activities, and the operators performance during conduct of the test. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. This review represented one sample.

b. Findings

No findings of significance were identified.

.3 Review of Condition Prohibited by Technical Specifications due to a Containment Atmosphere Dilution System Valve Out of Position

a. Inspection Scope

The inspectors evaluated the facts and circumstances surrounding a condition prohibited by Technical Specifications due to a Containment Atmosphere Dilution system valve being found out of position on September 7, 2006. During performance of post maintenance testing on solenoid valve SV-4334A, the manual isolation valve V-43-112 was discovered in a locked open position. This valve was required to be in a closed position to maintain primary containment isolation as prescribed by Technical Specification 3.6.1.3 required action A.1 due to the failure of SV-4334A. An evaluation was performed by the inspectors on the performance of licensee actions. A review of the operator logs, associated procedures, licensing basis documents, and corrective action documents were evaluated

by the inspectors. The documents listed in the Attachment were used by the inspectors to accomplish the objectives of the inspection procedure. This review represented one sample.

b. Findings

No findings of significance were identified.

.4 Review of Personnel Performance During a Trip of the 'B' Reactor Recirculation Pump

a. Inspection Scope

The inspectors reviewed personnel performance following an unplanned trip of the 'B' Reactor Recirculation Pump due to a failure in the motor generator field control circuit. The inspectors observed the operators performing plant manipulations to reduce reactor power and restore the 'B' Recirculation Pump to service to return to two loop operations. A review of the operator logs, 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. This review represented one sample.

b. Findings

No findings of significance were identified.

.5 (Closed) Licensee Event Report (LER) 05000331/2006-002-00: "Drywell Penetrations Calculations Do Not Account for Thermal Movement "

On March 18, 2005, while operating at 84 percent power, the licensee determined that the installed configuration of the Containment Vent Purge Exhaust line did not account for thermal movement of the Drywell. Specifically, the associated calculation did not account for the thermal or pressure related movement of the Drywell in its stress model since the model did not start at the Drywell shell and there were no thermal anchor movements or pressure anchor movement applied. As a result of the licensee's extent of condition review of all Drywell penetrations, an additional 14 Drywell penetrations were identified which required modifications to restore the penetrations to their original design requirements. These original 15 penetrations were modified during Refueling Outage 19, which ended on May 3, 2005. The licensee also identified 16 additional Drywell penetrations which would require further analysis. Subsequent to startup from the outage, the licensee determined that 8 of these remaining penetrations would require modification during the next refueling outage (February 2007) and the operability determinations for these 8 penetrations concluded that no current or past operability concerns exist. However, the licensee has determined that the past operability basis for the original 15 Drywell penetrations modified during the outage was non-conservative. Revised past operability evaluations, using a model based upon a newer version of the ASME Section III, Appendix F, which include thermal and pressure anchor movements are being performed and will be completed by October 31, 2006. The licensee submitted this voluntary LER for informational purposes only. Corrective actions taken by the licensee

included revising the Engineering Design Guide DGC-M100 "Stress Analysis and Support Design of Seismic Category I Piping System" to include guidance to account for Drywell shell movement due to thermal and pressure loading at accident conditions. The LER was reviewed by the inspectors and no findings of significance were identified. The licensee entered this issue into their corrective action program as Commitment 13444. This LER is closed.

.6 (Closed) LER 05000331/2006-003-00: "Residual Heat Removal Service Water Pump Inoperability Due to Motor Cooler Failures "

On June 30, 2006, while operating at 100 percent power the licensee identified water in the upper sight glass of the 'A' RHRSW pump motor oil reservoir and declared the pump inoperable. An extent of condition review determined that the 'B' and 'C' RHRSW pumps were also inoperable based on the same type and vintage motor cooler being installed. The inoperability of the three RHRSW pumps placed the plant in an 8 hour Technical Specification Limited Condition for Operation (LCO) to restore at least one pump in each train to an operable status. This event resulted in the plant being in a condition that could have prevented the fulfillment of a safety function of a system that is needed to remove residual heat and is therefore reportable. The 'C' RHRSW was restored to an operable status prior to the expiration of the 8 hour LCO on July 1, 2006, by replacement of the motor oil reservoir cooling coil with a new coil. The licensee evaluated this condition to be of nuclear safety significance due to both trains of the primary residual heat removal system being degraded simultaneously. The licensee attributed the failures of the motor oil reservoir cooling coils to erosion due to high ESW (river water) flow through the copper cooling coils. Corrective actions included performance of a root cause evaluation to determine causal factors leading to the failures and to perform an extent of condition assessment, revision of the Action Request procedure to require writing an action request to evaluate differences between vendor recommendation and operating practices when identified, and development of a permanent modification for the RHRSW pump motor coolers which incorporates controlled flow and stronger materials. This LER was reviewed by the inspectors and no finding of significance were identified. Additionally, the root cause evaluation was evaluated separately as an annual problem identification and resolution inspection sample, as documented in Section 4OA2.3 of this inspection report. The licensee entered this issue into their corrective action program as CAP042982 and CAP042987. This LER is closed.

4OA5 Other Activities

.1 (Closed) URI 07200032/2003-002-01: "Design of the Light Lifting Fixture"

During an inspection of pre-operational activities associated with dry fuel storage, the inspectors questioned the licensee's use of a light lifting assembly (LLA) in lieu of a NRC approved lifting yoke to lower the loaded cask from the refueling floor to the transfer transporter located at the ground level (Inspection Report No. 07200032/2003-002 DNMS). The LLA consisted of two sets of synthetic slings and an aluminum bar spreader assembly. The licensee replaced the yoke with the LLA due to the reactor building crane load limit of 100 tons. The LLA had not been analyzed for use during a seismic event.

Upon further review of this issue, the NRC staff determined that the use of the LLA was acceptable. The guidelines in Section 5.1.1 of NUREG 0612 state that the lifting device or

sling should be designed for the sum of the static and maximum dynamic load. However, a footnote states that loads imposed by the safe shutdown earthquake need not be included in the dynamic loads considered for the sling or lifting device.

Therefore, the staff concluded that consideration of any seismic loads for the design of the lifting device is not required by the regulatory guidance. This unresolved item is closed.

.2 (Closed) URI 07200032/2003-002-02: "Design of the Basket Hold Down Ring"

During an inspection of pre-operational activities associated with dry fuel storage, the inspectors observed that the fuel assemblies extended approximately 13 inches beyond the canister basket (Inspection Report No. 07200032/2003-002 DNMS). The licensee used a hold down ring to confine the fuel assemblies. However, the fuel assemblies were not confined in individual fuel slots within the basket hold down ring. The inspectors questioned the validity of the basket hold down ring design and expressed concerns regarding its capability to maintain criticality safety.

The staff reviewed the design of the Standardized HUHOMS System with 61 BT dry storage canister used at the plant which holds up to 61 boiling water reactor spent fuel assemblies. The staff compared the bottom hardware dimensions and active fuel heights of various boiling water reactor fuel assemblies to the neutron absorber plate dimensions in the 61 BT basket. The staff determined that only the non-fuel regions of the assemblies protruded from the top of the basket. Therefore, these fuel regions did not need to be confined by individual fuel slots within the basket hold down ring for criticality control purposes. This unresolved item is closed.

.3 (Closed) URI 07200032/2003-002-3: "Design of the Reactor Building."

During review of the heavy load program and the reactor building structural calculations in preparations to load spent fuel, the inspectors determined that the seismic design analysis of the reactor building and the crane did not include the horizontal pendulum and swinging loads from the lifted cask weight and lower load block as discussed in NUREG 0554 (Inspection Report No. 07200032/2003-002 DNMS). The licensee assumed in its calculations that the suspended load is free to sway and will not impart any forces into the reactor building structure. The inspectors questioned the validity of this assumption. The staff evaluated this issue further by review of crane licensing documents as well as other professional society codes associated with crane designs. Upon further review of this issue, the staff determined that, in the case of Duane Arnold reactor building crane, the loads associated with seismically induced pendulum effects were negligible. In addition, design loads used in structural analyses are usually half of the expected failure loads. This margin is sufficient to account for secondary loads such as pendulum loads without the need to specifically analyze those loads in the load analysis for the system. Therefore, the staff concluded that the exclusion of pendulum loads from the lifted cask weight and the crane load block in the structural calculation for Duane Arnold was consistent with structural engineering analyses and established industry standards. This unresolved item is closed.

.1 Exit Meeting

The inspectors presented the inspection results to Mr. G. Van Middlesworth and other members of licensee management on October 3, 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:

Radiation Protection inspection with Mr. J. Windschill, Radiation Protection/Chemistry Manager, and other members of your staff on August 25, 2006;

Emergency Preparedness inspection with Mr. P. Sullivan, Emergency Preparedness Manager, on September 14, 2006, via telephone;

Biennial Operator Requalification Program Inspection with Mr. G. Van Middlesworth, Vice President, on September 15, 2006;

Independent Spent Fuel Storage Installation with Mr. R. Murrell, Regulatory Affairs, on September 21, 2006, via telephone; and

Biennial Operator Requalification Program Inspection with Mr. J. Morris, Training Manager, on September 22, 2006, via telephone.

40A7 Licensee-Identified Violations

None.

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

Rick Ennis, Project Manager, NRR
Karl Feintuck, Project Manager, NRR
Bruce Burgess, Chief, Reactor Projects Branch 2

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000331/2006004-01	URI	Licensee Did Not Conduct Periodic Testing of All Simulator Malfunctions Used in Operator Qualification
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Closed

05000331/2006-002-00	LER	Drywell Penetrations Calculations Do Not Account for Thermal Movement
05000331/2006-003-00	LER	Residual Heat Removal Service Water Pump Inoperability Due to Motor Cooler Failures
07200032/2003-002-01	URI	The Design of the Light Fixture
07200032/2003-002-02	URI	The Design of the Basket Hold Down Ring
07200032/2003-002-03	URI	The Design of the Reactor Building

Discussed

None

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.

1R04 Equipment Alignment

Operating Instruction (OI) 152A1; HPCI System Electrical Lineup; Revision 0
OI 152A2; HPCI System Valve Lineup and Checklist; Revision 8
OI 152A4; HPCI System Control Panel Lineup; Revision 1
OI 454A1; ESW System Electrical Lineup; Revision 1
OI 454A4; "B" ESW System Valve Lineup and Checklist; Revision 9
OI 454A6; ESW System Control Panel Lineup; Revision 1
CAP 044175; CV1956A Did Not Fully Open During STP NS540002 ESW Operability Test
OI 730A1; CB Heating, Ventilation, and Air Conditioning System Electrical Lineup; Revision 1
OI 730A4; Plant Chilled Water System Valve Lineup; Revision 14
OI 730A6; CB Heating, Ventilation, and Air Conditioning System Control Panel Lineup; Revision 7
CAP 038827; Concern about the Possibility of Overloading the Startup Transformer
CAP 035727; High Differential Pressure Across RHR and Core Spray Test Return Valves Causing Erosion
CAP 035733; Hanger Clamp Detail Drawing for DLA-06-H-08 and DLA-06-SS-013 Does not Match Field
OI 149A1; RHR System Electrical Lineup; Revision 2
OI 149A2; "A" RHR System Valve Lineup and Checklist; Revision 7
OI 149A4; "B" RHR System Valve Lineup and Checklist; Revision 3
OI 149A6; RHR System Control Panel Lineup; Revision 1

1R05 Fire Protection

AFP 07; RB Laydown Area, Corridor and Waste Tank Area, and Spent Resin Tank Room; Revision 28
AFP 10; RB Main Exhaust Fan Room, Heating Hot Water Pump Room, and Plant Air Supply Fan Room; Revision 24
AFP 12; RB Decay Tank and Condensate Phase Separator Room; Revision 24
AFP 13; RB Refueling Floor Elevation 855'-0"; Revision 24
AFP 25; Control Building Cable Spreading Room; Revision 26
CAP 043298; Clear Plastic on Refuel Floor
AFP 69; Main Transformer 1X1; Revision 2
AFP 70; Standby Transformer 1X4; Revision 3
AFP 71; Startup Transformer 1X3; Revision 2
AFP 72; Auxiliary Transformer 1X2; Revision 1

1R06 Flood Protection Measures

Individual Plant Examination, Internal Flooding Analysis, Section 3.3.6, November 1992
Abnormal Operating Procedure 902, Flood, Revision 25

1R11 Licensed Operator Requalification Program

Emergency Operating Procedure 1, Reactor Pressure Control, Revision 14
Emergency Operating Procedure 2, Primary Containment Control, Revision 13

Anticipated Transient Without Scram-Reactor Pressure Vessel Control, Revision 15
Emergency Depressurization, Revision 5
Emergency Plan Implementing Procedure 1.2, Notifications, Revision 34
Integrated Plant Operating Instruction 5, Reactor Scram, Revision 45
EAL-01, Emergency Action Level Matrix, Revision 7
Seven Licensed Operators Medical Records; dated various
QF-1050-01a; Course/Cycle Feedback Summary Form; dated various
Management Observations of Training; Training Program Licensed Operator Requal; dated 2005
DAEC Licensed Operator Requalification Training 2005-2006, 2-Year Plan
Observation Report 2005-003-1-009, Trainee Feedback Effectiveness
Reactor Operator (RO)/SRO/ILC Curriculum Review Committee Meeting Minutes; dated various
2005 and 2006
OSS/OSM Curriculum Review Committee Meeting Minutes; dated various 2005 and 2006
QF-1040-04; Remediation Training Form; dated various 2006
QF-1040-15; Self-Study/Makeup Training Form; dated various 2005
TDF-4.01C; Training Center Attendance Sheet; dated January 2006 to August 2006
ODI-009; Quarterly Watchstanding Record; dated various
Simulator Scenario ESG 80; Revision 1
Simulator Scenario ESG 5; Revision 5
Simulator Scenario ESG 73; Revision 1
Simulator Scenario ESG 19; Revision 4
Simulator Scenario ESG 71; Revision 2
JPM 262001-05; Revision 6
JPM 2.1.12-01; Revision 2
JPM 211000-06; Revision 1
JPM 2.4.38-02; Revision 4
JPM 259001-11; Revision 3
JPM 223001-06; Revision 5
JPM 295015-01; Revision 1
JPM 263000-01; Revision 1
JPM 202002-01; Revision 12
JPM 206000-15; Revision 1
JPM 241000-02; Revision 2
JPM 262004-04; Revision 2
JPM 295018-01; Revision 1
JPM 201001-03; Revision 9
JPM 201001-04; Revision 10
JPM 2.2.12-03; Revision 1
JPM 203000-02; Revision 4
JPM 264000-09; Revision 3
TDAP 1835, Licensed Operator Requalification Program Examinations; Revision 1
DAEC Licensed Operator Requal 50008; Training Program Description; Revision 6
TDAP 1801.1; Organization and Responsibilities; Revision 7
TDAP 1801.2; Conduct of Training; Revision 10
TDAP-1801.3; Simulator Facility Administrative Program; Revision 4
TDAP-1801.4; Simulator Configuration Management; Revision 3
TDF-6.18; Simulator Work Request; Revision 1
ACP 110.1; Conduct of Operations; Revision 3
SOI-9.0; Documenting Certification Testing; Revision 8
SOI-10.0; Simulator Discrepancies; Revision 10

Focused Self-Assessment Report SA 042214 DAEC Operations Training - 71111.11B; dated July 17 - 21, 2006
 Focused Self-Assessment Report SA 041114 Licensed Operator and Shift Technical Advisor Continuing Training Program Evaluation; dated May 8 - 12, 2006
 Licensed Operator Requal (LOR) Shift Technical Advisor Continuing Training (STACT) Training Program Evaluation; dated 2005
 Operations Training Advisory Committee Meeting Minutes; dated various 2005 and 2006
 Training Oversight Committee Meeting Minutes; dated various 2005 and 2006
 Simulator Transient Tests, 2006; dated various
 Simulator Malfunction Tests, 2006; dated various
 Simulator Steady State Tests, 2006; dated various
 STPs, 2006; dated various
 Simulator Normal Evolution Tests, 2006; dated various
 List of Open Simulator Work Requests, 2006; dated various
 List of Closed Simulator Work Requests between January 2006 and September 2006
 Closed Simulator Work Requests, 2006; dated various
 DAEC Training Department Performance Indicator; Simulator Work Requests; dated 2006
 DAEC Information Technology Performance Indicator; Simulator Availability; dated 2006
 Corrective Action Program (CAP) 042179; Issue for Attention - LOR Assessment - Simulator Lead; dated May 12, 2006
 CAP 042184; Simulator Phones; dated May 12, 2006
 CAP 042186; Remediation Process; dated May 12, 2006
 CAP 042182; Simulator Work Orders; dated May 12, 2006
 CAP 042180; Simulator Availability; dated May 12, 2006
 Condition Reports Initiated for NRC Identified Issues
 CAP 044257; LOR Exam JPM K/As Less than 3.0; dated September 15, 2006
 CAP 044243; Simulator Certified Malfunction Test List Inconsistencies Identified; dated September 15, 2006
 CAP 044215; Potential Out of Spec Simulator Test Result Was Not Detected during Last Review; dated September 13, 2006
 CAP 044234; Procedure/Process Needed for Revision to Simulator Certification Tests; dated September 14, 2006
 CAP 044235; Minor Simulator to Plant Differences Are Excessive; dated September 14, 2006
 CAP 044237; DAEC Is Apparent Outlier in Region III Regarding "Overlap" of LOR Exams; dated September 14, 2006
 CAP 044216; Questionable Operations Training LOR Exam Integrity Issue; dated September 14, 2006

1R12 Maintenance Effectiveness

Start Up System (SUS) 4.00, 5.00, 6.00, 7.00, 17.00, 57.00, "Performance Criteria Basis Document for On-Site Distribution"; Revision 6
 Maintenance Rule Overview Module, Module 0; Revision 3
 Maintenance Rule Program Performance Criteria Development, Module 3; Revision 3
 Open and closed PWO and CWO list for 480 VAC system; July 26, 2006
 CAP 040149; "B Standby Gas Treatment System Inop Due to Degraded Variable Heater"; February 2, 2006
 CAP 036791; "Loss of 1B091 resulting in unplanned "A" side river water supply limiting condition for operation"; June 14, 2005
 SUS 9.00, 10.01, 10.02, 10.03, "Performance Criteria Basis Document for River Water Supply"; Revision 2

PWO 1121932; Pit Inspection at Intake Structure; dated June 10, 2002
CAP 042883; Intake Structure Fore-Bay Inspection Identified Significant Sand Accumulation;
June 22, 2006
CAP 042963; Intake Structure Sand; June 28, 2006
OPR 000335; Intake Structure Fore-Bay Inspection Identified Significant Sand Accumulation;
June 23, 2006

1R13 Maintenance Risk Assessments and Emergent Work Control

DAEC Online Schedule, Week 9627/9628; July 6, 2006
Maintenance Risk Evaluation for Week 28; July 6, 2006
CWO A79361; 1E-4A Drain IC-1128 Out of Service
DAEC Online Schedule, Week 9628/9629; July 13, 2006
Maintenance Risk Evaluation for Week 29; July 13, 2006
Maintenance Risk Evaluation for Week 29, Revision 1; July 18, 2006
DAEC Online Schedule, Week 9630/9631; July 27, 2006
Maintenance Risk Evaluation for Week 31; July 27, 2006
DAEC Online Schedule, Week 9635/9636; August 31, 2006
Maintenance Risk Evaluation for Week 36; August 31, 2006
Maintenance Risk Evaluation for Week 36, Revision 2; September 5, 2006
Maintenance Risk Evaluation for Week 36, Revision 3; September 6, 2006
DAEC Online Schedule, Week 9637/9638; September 14, 2006
Maintenance Risk Evaluation for Week 38; September 14, 2006

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

Control Rod Adjustment Sheets, Sequence B1/B2; Version 0722SE
STP 3.7.7-01; Bypass Valve Test; Revision 9
STP 3.3.1.1-19; Functional Test of TSV Closure Input to RPS and RPT; Revision 11
NS930002; Main Turbine Stop and Combined Intermediate Valves Test; Revision 3
CWO A73280; Repair Steam Tunnel Door 248; dated July 23, 2006

1R15 Operability Evaluations

CAP 042982; 1P22A Has Water In The Upper Sight Glass; dated June 29, 2006
CAP 042424; Unplanned LCO Entry, 1P22D INOP Due To Loss Of Oil In Upper Sight Glass;
dated May 26, 2006
Apparent Cause Evaluation 001627; Unplanned LCO Entry, 1P22D INOP Due To Loss Of Oil In
Upper Sight Glass; dated May 31, 2006
CAP 042987; Extent Of Condition For C and B RHRSW Pumps; dated June 30, 2006
OPR 000336; Extent Of Condition For C and B RHRSW Pumps; dated July 1, 2006
CAP 043529; RCIC Turbine Null Voltage Out Of Tolerance During Preventive Maintenance;
dated August 4, 2006
OPR 000338; RCIC Turbine Null Voltage Out Of Tolerance During Preventive Maintenance;
dated August 8, 2006
CAP 043556; OPR000338 For RCIC EGR Null Voltage Extended Beyond Nominal 72 Hours;
dated August 7, 2006
CAP 043838; SFUs Indicating Flow While Shutdown
OPR 000340; SFUs Indicating Flow While Shutdown
CE 0042211; SFUs Indicating Flow While Shutdown
CAP 043327; Control Room SFU Flow Indications are Different by 75 SCFM
CAP 043913; Pipe Flanges Are Not Accounted For In The Piping Analysis For V29-0005; dated
August 29, 2006

OPR 000341; Pipe Flanges Are Not Accounted For In The Piping Analysis For V29-0005; dated September 1, 2006

1R19 Post-Maintenance Testing

CWO A79240; Replace 'A' RHRSW Pump Motor Upper Bearing Cooling Coil; dated July 5, 2006
CWO A74692; Tune FIC7320A ('A' SFU flow controller) for Proper Response; dated August 2, 2006

CWO A70883; Install Standoffs on (terminals) AA-75 and AA-76 in 1C-41 & 1C-42; dated August 9, 2006

CWO A70272; Replace Manual Rod Movement Control Switch; dated August 10, 2006

PWO 1136402; Install Bryozoa Growth Monitoring Device in Pumphouse Stilling Basin; dated August 16, 2006

PWO 1136920; 1B91 Motor Control Center Molded Case Circuit Breaker Testing; dated September 11, 2006

1R22 Surveillance Testing

STP 3.1.7-03; Standby Liquid Control System Boron Concentration Test; Revision 11

STP 3.5.1-04, Low Pressure Coolant Injection Subsystem Simulated Automatic Actuation; Revision 2

STP 3.5.3-02; RCIC System Operability Test; Revision 19

STP NS500001; RCIC System Leakage Inspection Walkdown; Revision 2

STP 3.6.1.1-12; Containment Isolation Valve Leak Tightness Test-Type C Penetrations-Containment Atmosphere Valves; Revision 1

STP 3.3.3.2-09; Reactor Water Level And Pressure Instruments Calibration; Revision 18

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

Duane Arnold Energy Center Emergency Plan; Section D; Revision 25

Duane Arnold Energy Center Emergency Plan; Appendix 5; Revision 22

Duane Arnold Energy Center Emergency Plan; Appendix 6; Revision 24

1EP6 Drill Evaluation

Full Scale Dress Rehearsal Training Drill, September 20, 2006

Note 5; DAEC Emergency Action Level Notification Form; EAL Classified at 8:19 am on September 20, 2006

Note 5; DAEC Emergency Action Level Notification Form; EAL Classified at 9:51 am on September 20, 2006

Note 5; DAEC Emergency Action Level Notification Form; EAL Classified at 11:17 am on September 20, 2006

Note 5; DAEC Emergency Action Level Notification Form; PAR Determination at 11:40 am on September 20, 2006

Note 5; DAEC Emergency Action Level Notification Form; PAR Determination at 12:29 am on September 20, 2006

CAP 044444; MIDAS Procedure not Accurate for Emergency Preparedness Drill

2OS3 Radiation Monitoring Instrumentation and Protective Equipment

ACP 1411.20; Respiratory Protection; Revision 26

CAP 033612; 1C219A Found Inoperable; dated October 28, 2004

CAP 034868; RE8101B Particulate Channel for 1C219B D/W Rad Monitor Won't Source Check; dated February 11, 2005

CAP 039354; HP Instrument Pull List Not the Same as I&C/M&TE List; dated December 15, 2005

CAP 042859; Area and Process Rad Monitors Aging and in Excess of 30 Years Old; dated June 21, 2006
HPP 3106.04; Inspection, Maintenance and Quality Assurance of Respiratory Protection Equipment; Revision 15
HPP 3108.02; Inventory and Calibration Frequency for HP Instrumentation; Revision 11
HPP 3109.27; Operation of MGP-DMC Electronic Alarming Dosimeter; Revision 7
HPP 3109.71; Operation of Whole Body Counting System; Revision 13
HPP 3109.91; Operation of J.L. Shepherd Model 89 Calibrator; Revision 6
HPP 3110.01; Calibration of Eberline RO-2, RO-2a, RO-20 Ion Chamber; Revision 7
HPP 3110.03; Calibration of Eberline Teletector Doserate Meter; Revision 5
HPP 3110.26; Calibration of MGPI AMP-100/200; Revision 5
HPP 3110.27; Calibration of MGP-DMC Electronic Alarming Dosimeter; Revision 12
HPP 3110.46; Calibration of Eberline AMS-3 Continuous Air Monitor; Revision 4
HPP 3110.71; Calibration of Whole Body Counting Systems; Revision 12
STP 3.3.3.1-03; Primary Containment Area Radiation Post Accident Monitoring Instrumentation Electronic Calibration; Revision 2
STP 3.3.3.1.-08; Primary Containment Area Radiation Post Accident Monitoring Instrumentation Source Calibration Check; Revision 0
UFSAR/DAEC Section 12.3; Radiation Protection Design Features; Revision 13
Duane Arnold Energy Center 2005 and 1st and 2nd Quarter Radiation Protection Department Roll-Up Results
Nuclear Oversight Observation Report 2005-001-1-021; Radiation Protection Program Support; dated March 31, 2005

4OA2 Identification and Resolution of Problems

ACP 114.4, Corrective Action Program, Revision 21
ACP 114.5, Action Request System, Revision 52
2nd Quarter DAEC Radiation Protection Department Roll-Up Meeting Results; dated July 26, 2006
Radiation Protection Department Performance Indicators Summary Sheet; dated August 1, 2006
CAP 040018; Potential Trend In Personnel Contaminations-Evaluate For Common Cause; dated January 26, 2006
CE 003422; Potential Trend In Personnel Contaminations-Evaluate For Common Cause; dated January 30, 2006
Corrective Action (CA) 042300; Personnel Contamination-Establish Contamination Trigger For Work Area Decon; dated February 23, 2006
CAP 042382; Trend CAP: Particles Found Throughout The RMA For Follow Up To PerCon 06-15; dated May 24, 2006
CE 003913; Trend CAP: Particles Found Throughout The RMA For Follow Up To PerCon 06-15; dated June 23, 2006
CAP 042340; An In Plant Worker Got A Shoe Contamination In The Clean Area Of The Powerblock; dated May 21, 2006
CE 003900; An In Plant Worker Got A Shoe Contamination In The Clean Area Of The Powerblock; dated May 24, 2006
CAP 042821; Contamination Found In A Non Posted Area; dated June 20, 2006
CA 043532; Include Results Of CE003913 In Fuel Pool Clean-up Lessons Learned; dated June 23, 2006
CA 043533; Provide Training To The RP Organization On The Plant HVAC Systems; dated June 23, 2006
CA 043534; Implement Airflow Tool For High Contamination Work; dated June 23, 2006
DAEC Root Cause Evaluation Manual; Revision 8

DAEC Root Cause Evaluation Manual Attachment N; RCE Report Evaluation; dated September 7, 2006
RCE 001053; Root Cause Analysis of RHRSW Pump Motor Cooler Inoperabilities; Revision 0
RCE 001053; Root Cause Analysis of RHRSW Pump Motor Cooler Inoperabilities; Revision 2
Florida Power and Light Research and Evaluation Laboratory Test Report FPLE-TS-11845; dated June 16, 2006
Florida Power and Light Research and Evaluation Laboratory Test Report FPLE-TS-11869; dated July 14, 2006
CAP 042982; 1P22A Has Water In The Upper Sight Glass; dated June 29, 2006
CAP 042424; Unplanned LCO Entry, 1P22D INOP Due To Loss Of Oil In Upper Sight Glass; dated May 26, 2006
Apparent Cause Evaluation 001627; Unplanned LCO Entry, 1P22D INOP Due To Loss Of Oil In Upper Sight Glass; dated May 31, 2006
CAP 042987; Extent Of Condition For C and B RHRSW Pumps; dated June 30, 2006
OPR 000336; Extent Of Condition For C and B RHRSW Pumps; dated July 1, 2006

4OA3 Event Follow-up

Duane Arnold Shift Operations Logs for September 23 through September 25, 2006
CAP 044455; 'A' Recirculation Pump Seal #2 Pressure transient After 'B' Recirculation Pump Trip
CAP044457; Condensate Pressure Exceeded 575 psig Momentarily When Starting 'B' Reactor Feed Pump
CAP 044423; Condensate Pump Discharge Pressure Exceeds 575 psig
CAP 044066; Condition Prohibited by Technical Specification
STP 3.6.1.1-12; Containment Isolation Valve Leak Tightness Test - Type C Penetrations - Containment Atmosphere Valves; Revision 1
Duane Arnold Shift Operations Logs for August 1, 2006 through September 8, 2006
Special Test Procedure (spTP) 210; Special Test Procedure for Pressure Regulator Dynamic Tuning; Revision 0
spTP 210; Pressure Regulator Dynamic Tuning; Revision 1
spTP 211; Power Ascension test to Greater than 1840 MW thermal; Revision 0
spTP 211; Power Ascension test to Greater than 1840 MW thermal; Revision 1
CAP 043797; Unexpected Cycling of CV-1072, 1T-92B Drain Valve
CAP 043794; Vibrations on 1 Inch Feedwater drain Line Increased
CAP 043511; Turbine Lube Oil Performance During Hot Weather
Engineering Documentation Package for Extended Power Uprate (EPU) Phase IIIa: Power Ascension from 1840 MW thermal; Revision 0
spTP 212; HPCI Keep Fill Test; Revision 0
spTP 212; HPCI Keep Fill Test; Revision 1
HPCI Keep Fill Test Readiness Review Meeting Minutes; dated August 24, 2006
CAP 043569; Temperature Eval Needed For EBB005 Pipe Upstream Of MO2312 For Keep Fill Special Test; dated August 8, 2006
CE 004154; Temperature Eval Needed For EBB005 Pipe Upstream Of MO2312 For Keep Fill Special Test; dated August 10, 2006

4OA5 Other Activities

Memorandum; Response to Technical Assistance Request Dated December 12, 2003, for Nuclear Management Company's Duane Arnold Independent Spent Fuel Storage Installation; dated April 30, 2004
Memorandum; Differing Professional Opinion Concerning the Duane Arnold Energy Center Reactor Building Crane; dated October 28, 2004

LIST OF ACRONYMS USED

ACP	Administrative Control Procedure
AFP	Area Fire Plan
ANSI/ANS	American National Standard Institute/American Nuclear Society
CA	Corrective Action
CAP	Corrective Action Process
CB	Control Building
CE	Condition Evaluation
CFR	Code of Federal Regulations
CWO	Corrective Work Order
DRP	Division of Reactor Projects
DRS	Division of Reactor Safety
EAL	Emergency Action Level
EP	Emergency Preparedness
ESW	Emergency Service Water
HPCI	High Pressure Coolant Injection
IMC	Inspection Manual Chapter
IR	Inspection Report
JPM	Job Performance Measure
LER	Licensee Event Report
LLA	Light Lifting Assembly
LORT	License Operator Requalification Training
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
OI	Operating Instruction
OOS	Out of service
OPR	Operability
PARS	Publicly Available Records
PCE	Personnel Contamination Event
PMT	Post-Maintenance Testing
PWO	Preventive Work Order
RCE	Root Cause Evaluation
RCIC	Reactor Core Isolation Cooling
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
RO	Reactor Operator
SAT	Systems Approach to Training
SCBA	Self-Contained Breathing Apparatus
SDP	Significance Determination Process
SFU	Standby Filter Unit
spTP	Special Test Procedure
SSCs	Structures, Systems, and Components
STP	Surveillance Test Procedure
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item