

# Duane Arnold

## 4Q/2006 Plant Inspection Findings

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### Initiating Events

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### Mitigating Systems

**Significance:**  Dec 31, 2006

Identified By: NRC

Item Type: FIN Finding

#### **CREW PERFORMANCE ON THE DYNAMIC SCENARIO PORTION OF THE 2006 FACILITY-ADMINISTERED ANNUAL REQUALIFICATION EXAMINATION OPERATING TEST.**

A finding of very low safety significance was identified. The finding was associated with unsatisfactory operating crew performance on the simulator during facility-administered licensed annual operator requalification examinations. Of the ten crews evaluated, two did not pass their annual operating tests. The finding is of very low safety significance because the failures occurred during testing of the operators on the simulator, because there were no actual consequences to the failures, and because the crews were removed from watch-standing duties, retrained, and re-evaluated before they were authorized to return to control room watches. This issue was documented in the licensee's corrective action process (CAP) as CAP 044379.

Inspection Report# : [2006005](#) (*pdf*)

**Significance:**  Jun 30, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

#### **FAILURE TO PERFORM AN ADEQUATE RISK ASSESSMENT.**

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.

Inspection Report# : [2006003](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### Calculation Deficiency for Potential Vortexing in CST

The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance involving the calculation of low level setpoints for the CST. Specifically, the licensee did not include a quantitative analysis of the transfer time in the calculation and subsequently, did not fully address the potential for air entrainment in the high pressure injection pump due to vortexing. The licensee determined the high pressure injection system was operable based on available margin in the calculation. The licensee entered the finding into their corrective action program as CAP 040973.

The finding was more than minor because the failure to account for this transfer time reduced the margin available to prevent air entrainment into the high pressure coolant injection (HPCI) system and affected the Mitigating Systems cornerstone attribute of design control. The finding was of very low safety significance based on the results of the licensee's analysis and screened as Green using the SDP Phase 1 screening worksheet. The cause of the finding was related to the cross-cutting element of problem identification and resolution.

Inspection Report# : [2006007](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Inadequate Torquing of 250Vdc, 125Vdc and 48Vdc Batteries Electrical Connections**

The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance involving licensee's failure to ensure that the torque values specified in the maintenance procedure for safety related and important to safety 250Vdc, 125Vdc, and 48Vdc batteries, were correctly incorporated from vendor specified design data and from the licensee's design standard into the procedure. Consequently, all 250Vdc, 125Vdc, and 48Vdc battery electrical terminal connections were under-torqued during battery replacement activities, in 2003. The licensee's corrective action included performing a condition evaluation to determine status of the batteries, and entering this performance deficiency into their corrective action program for resolution as CAP041156, CAP041422, and CAP 041734.

This finding was more than minor because the batteries procedure deficiency affected plant equipment and was associated with the attribute of design control and equipment performance of the Mitigating Systems cornerstone. Specifically, improper torquing could result in unacceptable battery terminal connection resistance and decreased battery capacity, rendering the dc system incapable of performing its required safety function. The finding was of very low safety significance based on the results of the licensee's analysis and screened as Green using the SDP Phase 1 screening worksheet.

Inspection Report# : [2006007](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

#### **Electrical Components Downgraded from SR to NSR Without Appropriate Isolation Devices**

The team identified a Non-Cited Violation of 10 CFR 50 Appendix B, Criterion III, "Design Control," having very low safety significance for failure to ensure that proper design control was maintained. Specifically, the licensee failed to perform a comprehensive design review of a 1992 modification that had incorrectly downgraded the quality classification of two level indicating switches. As a result of this team's inquiries, four additional examples of mis-classified equipment were identified. The licensee entered the finding into their corrective action program as CAP041107 and CAP041731.

The finding was more than minor because, without proper electrical isolation devices, failure of QL4 (non-safety) classified devices could cause a loss of QL1(safety related) classified equipment. This finding was of very low safety significance based on the results of the licensee's analysis and screened as Green using the SDP Phase 1 screening worksheet. The cause of this finding was related to the cross-cutting aspect of problem identification and resolution, in that, the licensee did not

fully evaluate the condition adverse to quality in 2004.

Inspection Report# : [2006007](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **UFSAR Table 8.2-1 Had No Documented Basis**

The team identified a Non-Cited Violation of 10 CFR 50, Appendix B, Criterion III, Design Control, having a very low safety significance pertaining to lack of design basis for the values listed in Updated Final Safety Analysis Report Table 8.1-2. The licensee could not identify an active calculation that supported the values listed in the table. In response to this deficiency, the licensee initiated CAP 041395 to develop the basis for the values indicated in the UFSAR table.

The finding was more than minor because control relay settings and design voltage values could be incorrectly set based on these unsupported values. The finding was of very low safety significance based on the results of the licensee's analysis and screened as Green using the SDP Phase 1 screening worksheet.

Inspection Report# : [2006007](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Non-Safety Related Charger Used to Charge a Cell of a 125Vdc SR Battery Without Electrical Isolation**

The team identified a Non-Cited Violation of TS 5.4.1a, "Procedures," having a very low safety significance pertaining to licensee's failure to establish and use an appropriate procedure for charging a single cell of a safety related battery. A portable non-safety related charger was used to charge a single cell of a safety related battery without maintaining the required electrical isolation between the safety related battery and the non-safety related charger. The licensee initiated CAP 041099 to modify existing maintenance procedures.

This finding was more than minor because failure to maintain electrical isolation could render the safety related battery inoperable. The finding was of very low safety significance based on the results of the licensee's analysis and screened as Green using the SDP Phase 1 screening worksheet.

Inspection Report# : [2006007](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Establish a Testing Program for Molded Case Circuit Breakers (MCCBs)**

The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," having very low safety significance for failure to implement a testing program to ensure that the installed safety related and important-to-safety molded case circuit breakers (MCCBs) will perform satisfactorily in service. This issue was entered into the licensee's corrective action program as CAP041363. The licensee was planning to purchase new test equipment and commence testing a statistical sample of the installed MCCBs to corroborate MCCB operability.

The finding was more than minor because the installed MCCBs were not adequately exercised or tested and were beyond the manufacturer's design life. This condition could effect breaker coordination, over-current protection, fire prevention, and multiple other safety related and important to safety functions. The finding was of very low safety significance because licensee determined the issue was a qualification deficiency confirmed not to result in loss of operability per "Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment." The cause of the finding was related to the cross-cutting aspect of problem identification and resolution.

Inspection Report# : [2006007](#) (*pdf*)

G**Significance:** Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

**Simulation of Operator response to an SBO event**

The team identified a Non-Cited Violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," having very low safety significance for failing to maintain adequate procedures to establish alternate ventilation within a minimum time after the onset of a station blackout event. The licensee entered the finding into their corrective action program as CAP 041379 and commenced an extensive root cause investigation.

The finding was more than minor because failure to establish alternate ventilation within the analyzed time limit could result in excessive temperatures in the rooms and impact the performance of equipment. Although the use of an inadequate procedure increased the likelihood of undesirable consequences from an SBO event, the finding was of very low safety significance because it did not involve a design or qualification deficiency, did not represent a loss of safety function, and did not involve an external initiating event. The cause of the finding is related to the cross-cutting element of problem identification and resolution.

Inspection Report# : [2006007](#) (*pdf*)G**Significance:** Mar 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

**FAILURE TO ENSURE PROPER DESIGN CONTROL WAS MAINTAINED WITH THE SBDG.**

A finding of very low safety significance was identified by the inspectors for the failure to ensure proper design control was maintained during loading of the standby diesel generators (SBDG). The licensee entered this issue into their corrective action program and performed additional analysis to verify operability.

The finding was determined to be greater than minor because the finding is associated with the design control attribute of the Mitigating Systems cornerstone and it affects the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The finding was of very low safety significance because overall system operability did not change. An NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," was identified for the failure to verify or check the adequacy of design associated with the SBDG.

Inspection Report# : [2006002](#) (*pdf*)G**Significance:** Mar 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

**FAILURE TO ENSURE PROPER DESIGN CONTROL WAS MAINTAINED WITH THE FEEDWATER PIPING HANGERS.**

A finding of very low safety significance was identified by the inspectors for the failure to ensure proper design control was maintained with feedwater piping hangers DBD-4-H57A and DBD-4-H50A. The primary cause of this finding was related to the cross-cutting area of Human Performance because of the failure to provide adequate attention to detail during the preparation of calculations by engineering personnel. The licensee entered this issue into their corrective action program and performed additional analysis to verify operability.

The finding was determined to be greater than minor because the finding is associated with the design control attribute of the Barrier Integrity cornerstone and it affects the cornerstone objective of providing reasonable assurance that physical design barriers (containment) protect the public from radionuclide releases caused by accidents or events. The finding was of very low safety significance because overall system operability did not change. An NCV of 10 CFR 50, Appendix B, Criterion III, "Design Control," was identified for the failure to verify or check the adequacy of design associated with feedwater piping hangers DBD-4-H57A and DBD-4-H50A.

Inspection Report# : [2006002](#) (*pdf*)G**Significance:** Jun 07, 2005

Identified By: NRC

Item Type: VIO Violation

### **Failure to Demonstrate Adequacy of Design Assumption for Torus Attached Piping**

A violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control" having very low safety significance was identified by the inspector. Specifically, the licensee failed to demonstrate that a 1996 high pressure coolant injection (HPCI) modification was subjected to design control measures commensurate with those applied to the original design. The licensee also failed to apply design control measures to verify the adequacy of the design in order to assure that the design basis for torus attached piping was correctly translated into the modification's specifications, drawings, procedures and instructions.

The finding was more than minor because the finding was associated with the cornerstone attribute of design control in the mitigating system cornerstone and the finding was determined to affect the associated cornerstone objective of ensuring the availability of the HPCI system when called upon. Under the worst case scenario, movement of the torus with the additional valve weight on the HPCI turbine exhaust line would result in crimping of the line. Crimping of the line would create additional backpressure in the HPCI turbine and would result in a decrease in the amount of water being injected into the reactor vessel. The finding was determined to be of very low safety significance based upon a Phase 2 analysis of those transients which would involve movement of the torus.

The finding was cited since the licensee did not enter the issue into its corrective action program and did not take actions to correct the noncompliance.

Inspection Report# : [2005010](#) (*pdf*)

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## **Barrier Integrity**

**Significance:** SL-III May 01, 2006

Identified By: NRC

Item Type: VIO Violation

### **Failure to complete the "Pre Fuel Move Checklist" before moving irradiated fuel bundles in the DAEC spent fuel pool**

Duane Arnold Energy Center (DAEC) Refueling Procedure No. 403, "Performance of Fuel Handling Activities," Revision No. 16, was issued on June 16, 2004, and required that the designated fuel handling supervisor complete applicable sections of the "Pre Fuel Move Checklist" before starting fuel handling activities. On November 9, 2004, a refueling floor supervisor, who was primarily responsible for preparing Revision No. 16 to the procedure, was the designated fuel handling supervisor and he failed to complete the "Pre Fuel Move Checklist" before moving three irradiated fuel bundles in the DAEC spent fuel pool, as required by the refueling procedure.

The NRC Office of Investigations (OI) conducted an investigation of the event involving a former supervisor's apparent willful violation of a DAEC refueling procedure on November 9, 2004. The OI investigation was completed on October 26, 2005. (OI Case 3-2004-033).

Based on the information developed during the OI investigation and the information provided by the licensee in an April 7, 2006 letter, the NRC has determined that a SL III violation of NRC requirements occurred. The NRC has determined that this was a willful violation, demonstrating at least careless disregard of a procedure required by DAEC Technical Specification 5.4.1.

Inspection Report# : [2006016](#) (*pdf*)

**Significance:**  Apr 21, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **RCIC Pump Suction Valves Automatic Control Logic**

The team identified a Non-Cited Violation (NCV) of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," having very low safety significance involving the control logic of reactor core isolation cooling (RCIC) pump suction valves MO-

2516 and MO-2517. Design Change Request 1040 modified the control logic and did not retain the remote-manual closure capability of these containment isolation valves. This remote-manual closure capability was specifically addressed in NRC correspondence. As an interim measure, the licensee revised an operating procedure to allow the operators to manually block specific relay contacts in the control room, allowing these valves to be closed if required. The licensee entered the finding into their corrective action program as CAP 041114.

The finding was more than minor because failure to retain the remote-manual closure capability of these valves was associated with the attribute of design control, which affected the barrier integrity cornerstone objective of ensuring the functionality of the primary containment isolation valves. The finding was of very low safety significance based on the results of the licensee's analysis and screened as Green using the SDP Phase 1 screening worksheet.

Inspection Report# : [2006007](#) (*pdf*)

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## Emergency Preparedness

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## Occupational Radiation Safety

**Significance:** SL-III May 01, 2006

Identified By: NRC

Item Type: VIO Violation

**Failure to notify health physics or ensure that health physics personnel were present prior to relocating irradiated items in the cask pool**

Duane Arnold Energy Center (DAEC) Control Procedure ACP1407-2, "Material Control in the Spent Fuel Pool and Cask Pool," Revision 10, dated November 4, 2002, a procedure that implemented Technical Specification 5.4.1 and Regulatory Guide 1.33, provided, in part, that health physics shall be notified and present prior to relocating or removing any item stored in the spent fuel pool and cask pool. On July 23, 2003, a Refueling Floor Supervisor directed an operator to relocate irradiated items in the cask pool without notifying health physics or ensuring that health physics personnel were present prior to relocating the irradiated items.

The NRC Office of Investigations (OI) conducted an investigation of the event involving a former supervisor's apparent deliberate violation of a radiation protection procedure on July 23, 2003. The OI investigation was completed on February 6, 2004 (OI Report No. 3-2003-021).

Based on information developed during the OI Investigation, information provided during the June 1, 2004, PEC, and all other pertinent information, the NRC determined that a SL III violation of NRC requirements occurred at DAEC on July 23, 2003. The NRC has determined that this was a deliberate violation of NRC requirements.

Inspection Report# : [2006017](#) (*pdf*)

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## Public Radiation Safety

**Significance:**  Mar 31, 2006

Identified By: NRC

Item Type: FIN Finding

**FAILURE TO MEET INDUSTRY STANDARDS FOR THE UNCONDITIONAL RELEASE OF BULK AGGREGATE LIQUID AND SOLID MATERIALS.**

An inspector-identified finding of very low safety significance was identified for the failure to meet the industry standard of using the environmental Lower Limit of Detection (LLD) when surveying, and analyzing bulk aggregate and liquid

materials prior to unconditional release from the site.

The finding was more than minor because it was associated with the Public Radiation Safety cornerstone attribute of program and processes, and potentially affected the cornerstone objective of ensuring adequate protection of public health and safety from exposure to radioactive materials released into the public domain. The finding was of very low safety significance because public exposure resulting from the release of bulk aggregate solid or liquid materials at effluent LLD values was less than 0.005 rem, and there were less than 5 occurrences during the inspection period. The finding was based on the licensee's failure to meet an industry standard.

Inspection Report# : [2006002](#) (*pdf*)

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## Physical Protection

[Physical Protection](#) information not publicly available.

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## Miscellaneous

Last modified : March 01, 2007