July 12, 2005

Mr. Gary Van Middlesworth
Site Vice-President
Duane Arnold Energy Center
Nuclear Management Company, LLC
3277 DAEC Road
Palo, IA 52324

SUBJECT: DUANE ARNOLD ENERGY CENTER NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT 05000331/2005009 (DRP)

Dear Mr. Van Middlesworth,

On June 10, 2005, the NRC completed a baseline team inspection on the Identification and Resolution of Problems at your Duane Arnold Energy Center. The enclosed report documents the inspection findings which were discussed on June 10, 2005, with you and other members of your staff.

This inspection was an examination of activities conducted under your license as they relate to the identification and resolution of problems, compliance with the Commission's rules and regulations and with the conditions of your operating license. Within these areas, the inspection involved a selected examination of procedures and representative records, observations of activities, and interviews with personnel.

On the basis of the sample selected for review, the inspectors concluded that, overall, problems were properly identified, evaluated, and corrected at the Duane Arnold Energy Center. Three findings of very low safety significance (Green) were identified during this inspection. Two of the findings involved untimely corrective actions for degraded fire impairments and control room smoke issues. The third finding was for failure to identify and minimize combustibles within the owner-controlled area. Because of their very low safety significance and because these issues were entered into your corrective action program, the NRC is treating these issues as Non-Cited Violations in accordance with Section VI.A.1 of the NRC's Enforcement Policy. If you deny any of these Non-Cited Violations, you should provide a response with the basis for your denial, within 30 days of the date of this inspection report, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001; with copies to the Regional Administrator, Region III; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Duane Arnold Energy Center.

In addition, several examples of minor problems were identified and discussed in this report, including conditions adverse to quality that were not prioritized and evaluated adequately in the corrective action process, narrowly focused apparent cause evaluations, ineffectively utilized operating experience information, and inadequate corrective actions for a adversely trending procedure adherence issue.

In accordance with 10 CFR 2.790 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/NRC/ADAMS/index.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Bruce Burgess, Chief
Branch 2
Division of Reactor Projects

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

Enclosure: Inspection Report 05000331/2005009(DRP)

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REGION III

Docket No:	50-331
License No:	DPR-49
Report No:	05000331/2005009 (DRP)
Licensee:	Nuclear Management Company
Facility:	Duane Arnold Energy Center
Location:	3277 DAEC Road Palo, Iowa 52324-9785
Dates:	May 23 - June 10, 2005
Inspectors:	R. Langstaff, Senior Reactor Inspector, Lead Inspector C. Zoia, Project Engineer R. Baker, Resident Inspector
Approved by:	Bruce Burgess, Chief Branch 2 Division of Reactor Projects

Enclosure

SUMMARY OF FINDINGS

IR 05000331/2005009; 05/27-06/10/2005; Nuclear Management Company Duane Arnold Energy Center, Problem Identification and Resolution Inspection.

This inspection was conducted by a senior reactor inspector, a project engineer, and the resident inspector. The inspection identified a total of three Green findings which were classified as Non-Cited Violations (NCVs). 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 Nuclear Regulatory Commission (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.

Identification and Resolution of Problems

Station personnel normally identified and entered problems into the corrective action (CA) program using corrective action program forms (CAPs), and the licensee was effective in identifying and appropriately characterizing these problems. In evaluating problem identification, one new issue was identified by the inspectors during a reactor building walkdown. As discussed in more detail as a Green finding under the initiating events cornerstone, the licensee failed to identify and minimize combustibles within the owner-controlled area.

The licensee appropriately classified, in most instances, items entered into the corrective action program into one of four significance levels (A-D), with the most safety significant issues being given an "A" significance classification. For significance classification, the inspectors identified two areas of concern. First, one screened Operating Experience (OE) issue was not considered appropriately significant and was not addressed adequately. Second, the inspectors noticed a few examples of inconsistency in how issues were classified in the corrective action program.

Apparent cause evaluations (ACE's) usually did an adequate job of identifying specific failures associated with deficiencies. Nevertheless, they did not consistently address why deficiencies occurred or how other factors associated with specific failures contributed to an issue. Reviews of level "B" ACE's revealed that some evaluations missed important contributing factors, and consequentially, the corrective actions for these contributing factors were not addressed.

Appropriate corrective actions were usually taken for items entered into the corrective action program. However, the corrective action program was not always effective in fully resolving some specific issues. Explanations of these specific instances are provided with documentation of the two Green findings under the mitigating systems cornerstone.

The corrective action program was used to trend issues, and its effectiveness of the trending was usually adequate. Overall, the team concluded that the licensee adequately implemented the corrective action program in the identification, evaluation and correction of problems.

A. Inspector Identified and Self-Revealed Findings

Cornerstone: Initiating Events

- Green. A finding of very low safety significance was identified by the inspectors for failure to identify unapproved transient combustibles in the reactor building. The transient combustibles consisted of wood planking on scaffolding in the motor-generator set room of the reactor building. The primary cause of this finding was related to the cross-cutting area of Human Performance. Despite a license condition to perform periodic inspections to minimize transient combustibles, licensee personnel failed to identify that scaffolding contained unapproved combustibles for 231 days.

  This finding was more than minor because the failure to identify transient combustibles, if left uncorrected, could lead to a more safety significant concern. Also, a fire involving scaffolding materials could affect cable trays containing cables important to safety, thereby increasing the probability that a safety function would be challenged. The finding was of very low safety significance because of the low degradation rating against the combustible control program, since wood will not ignite to a fire from existing sources of heat or electrical energy. The issue was a Non-Cited Violation (NCV) of license condition 2.C.(3) which required the licensee to implement and maintain in effect all provisions of the approved fire protection program. (Section 4OA2.a.(3).1)

Cornerstone: Mitigating Systems

- Green. A finding of very low safety significance was identified by the inspectors for failure to take timely corrective actions in addressing three degraded fire barriers. The primary cause of this finding was related to the cross-cutting area of Problem Identification and Resolution, since each of the fire barriers was degraded over 21 months without being repaired or replaced.

  This finding was more than minor because three fire barriers used to mitigate the effects of a fire were degraded. The finding was of very low safety significance for the following reasons: the first barrier contributed an estimated risk of less than 1×10^{-6} per year; the second barrier would provide a minimum of 20 minutes fire endurance protection and would not be subject to direct flame impingement; and the third barrier provided a minimum of a 2-hour fire endurance rating. The finding was determined to be an NCV of license condition 2.C.(3), which required the licensee to implement and maintain in effect all provisions of the approved fire protection program. (Section 4OA2.c.(3).1)

- Green. A finding of very low safety significance was identified by the inspectors for the failure to take prompt corrective actions for identified procedural deficiencies in response to smoke in the control room. The primary cause of this finding was related to the cross-cutting area of Problem Identification and Resolution because the procedural deficiencies were identified by the NRC more than two years prior to this inspection.

  This finding was more than minor because smoke in the control room could hinder the operators' ability to shutdown the plant. This finding was of very low safety significance because self-contained breathing apparatus (SCBA) were readily available in the control

room and smoke intrusion would be limited. This finding was determined to be an NCV of 10 CFR 50, Appendix B, Criterion XVI, which required that conditions adverse to quality were promptly identified and corrected. (Section 4OA2.c.(3).2)

B. Licensee-Identified Findings

No findings of significance were identified.

REPORT DETAILS

4. OTHER ACTIVITIES (OA)

4OA2 Problem Identification and Resolution

a. Effectiveness of Problem Identification

(1) Inspection Scope

The inspectors conducted a review of the process for identifying and correcting problems at the Duane Arnold Energy Center (DAEC). The inspectors reviewed licensee and inspector identified issues related to the seven safety cornerstones since January 2003 to determine if problems were appropriately identified, characterized, and entered into the corrective action program. The problem identification and resolution program's effectiveness was evaluated by reviewing issues identified in selected corrective action program documents and records, and by discussions with licensee personnel.

To improve efficiency, the inspectors were provided limited access to the licensee's corrective action program computer database. This allowed the inspectors to directly retrieve information on particular corrective action program forms (CAPs), and enabled specific searches for issues and trends. In a few instances, the inspectors found that the access available was overly restrictive and made searches on issues difficult. This caused minor problems when using the database to perform trends or historical reviews.

The inspectors reviewed documents associated with the corrective action program in order to determine if problems were being identified at a proper threshold and entered into the corrective action process. The documents reviewed included previous NRC inspection reports, Action Requests (ARs), fire protection documents, and CAPs. In order to identify the presence of longstanding unresolved issues the inspectors reviewed a list of all ARs and CAPs issued during the last three refueling outages. The inspectors also reviewed the licensee's efforts to capture and address industry operating experience (OE) issues in the corrective action program. The OE documents reviewed included industry operating events, NRC generic communications, and internal documents.

The inspectors reviewed records of an internal fleet self-assessment of the DAEC implementation of corrective action processes (including root cause evaluations (RCEs), apparent cause evaluations (ACEs), corrective action review board (CARB) performance, CAP screening, and trending) by the Duane Arnold corrective action program organization. Several CAPs written by licensee personnel on the audit and assessment findings were reviewed to verify that adequate corrective actions had been or were being taken. The inspectors additionally reviewed licensee quarterly audits and self-assessments performed by the site Nuclear Oversight (NOS) organization since January 2003. The review was conducted to determine whether the audit and self-assessment program was effectively managed, adequately covered the subject areas, and to determine whether the associated findings were appropriately captured in

corrective action reports. The review included interviews with the licensee staff regarding the audit and self-assessment programs. The inspectors also reviewed an operability evaluation for residual heat removal service water (RHRSW) and conducted a walkdown of the reactor building. A listing of specific documents reviewed is attached to the report.

(2). Assessment

The team determined that the licensee was generally effective in identifying and characterizing problems, however, an exception was identified by the inspectors during a walkdown of the reactor building. As discussed in more detail in the finding below, the inspectors found one instance where the licensee did not identify and minimize combustibles within the owner-controlled area. Nevertheless, the team found that the significance threshold for characterizing issues in CAPs was usually appropriate.

.1 Licensee Audit and Self-assessment Evaluation

The quarterly audits and self-assessments conducted by the NOS group appeared to be of appropriate depth and scope, with findings and recommendations appropriately documented in the corrective action program. The sections of the licensee audits and self-assessments which focused on the corrective action program, captured issues analogous to those identified by the inspectors. The inspectors noted that although the significance threshold for entering issues into the program appeared appropriate, many issues which could be classified as 'work tracking' items were being entered into the CAP (quality assurance records) portion of the licensee's computer based program versus the non-CAP (informational records) portion of the system. This resulted in an additional work load for members of the CARB during corrective action (CA) screening. This issue was also identified by the NOS quarterly audits and is currently being trended in the corrective action program.

The team's review of the licensee's self-assessments concluded that, in general, the licensee was effective at evaluating corrective program implementation, that, in most cases, licensee audits and assessments results were entered into the corrective action program, and that CAPs were written for significant issues.

.2 Trending Program Evaluation

The team reviewed how the licensee's equipment trending activities, which included programs for System Health reporting, Maintenance Rule evaluation, and unexpected Corrective Maintenance and Equipment Reliability tracking, interfaced with the corrective action program, and noted good coordination between the various trending programs and the corrective action program.

The team also observed use of the licensee's computer based System Monitoring and Reporting Tool (SMART) program to monitor system performance. The SMART program gathered information from a number of sources, including the online plant process computer and recorded equipment parameters obtained by non-licensed operators conducting rounds, for evaluation by the system engineer. The system also allowed the engineers to input values or formulas with provisions for notifying the

engineer when the specified conditions have been met or exceeded. This feature provided essentially real time status of equipment trending which is largely independent from experience or knowledge of the associated equipment or component engineers.

The team evaluated the licensee's overall trending program as acceptable. The station was able to identify individual, specific deficiencies and entered those deficiencies into the corrective action program database. However, as documented by specific examples in the following sections, the team identified several instances where programmatic weaknesses are impacting trending of issues effectiveness. In general, evaluations performed by the licensee successfully identified failure mechanisms surrounding identified problems, but fail to include enough rigor to isolate the causal factors responsible for the identified failures and ensure effective corrective actions are identified to prevent recurrence. Proficiency in the use of recently implemented fleet guidelines and procedures is required to improve the quality of completed evaluations.

(3). Findings

.1 Identification of Transient Combustibles

Introduction: The inspectors identified an Non-Cited Violation (NCV) of a license condition having very low safety significance (Green) for failing to identify the presence of wood scaffolding in the reactor building without an approved permit.

Description: On May 27, 2005, the inspectors conducted a walkdown of the reactor building and identified scaffolding in the Recirculation pump motor generator room without a Combustible Material/Flammable Liquid Control permit. Discussions with the Fire Marshal confirmed that the scaffolding was not listed in the Fire Marshal's database of permits.

The scaffolding had wood planking and was located directly beneath and within several feet of cable trays. Specifically, the cable trays were within the Ball and Column Zone of Influence for thermoset cables as described in Table 2.3.2 of Inspection Manual Chapter 609 Appendix F, "Fire Protection Significance Determination Process," issued February 28, 2005, for a 200 kilowatt fire, that is, the 98th percentile fire for solid and transient combustibles. Therefore, a fire involving the wood scaffolding materials could affect the cable trays. The inspectors estimated that the weight of the wood planking in the scaffolding exceeded 100 pounds. The cable trays contained cables important to safety, including a control cable for variable heaters for one train of the standby gas treatment system. The inspectors noted that the scaffolding and associated wood planking was readily observable and represented a significant quantity of transient combustibles.

Procedure ACP 1412.2, "Control of Combustibles," specified that class "A" materials exceeding 100 pounds may be brought into power block buildings by permit only and defined wood as a class "A" material. The procedure also noted that the use of wood in the power block buildings shall be minimized.

Section 4.10 of the Fire Plan stated that the Fire Marshal was responsible for conducting periodic inspections to minimize combustibles within the owner-controlled area. In

addition, procedure ACP 1412.2, stated that the Fire Marshal was responsible for performing periodic inspections to assure transient combustibles were located, used, and documented with a Combustible Material/Flammable Liquid Control permit. Regulatory assurance found that the scaffolding had been in place since October 8, 2004, or 231 days. This raised an issue regarding how effective periodic inspections were in identifying transient combustibles.

The Fire Marshall then initiated CAP036606 to address the transient combustible issues, but the corrective actions prescribed initially were weak. Specifically, the CAP only included verifying the combustible materials added during the installation of the scaffolding were within limits permitted by the DAEC Fire Hazards Analysis, and initiating a Combustible Material/Flammable Liquid Control permit. However, the CAP did not evaluate the need for the materials continued presence or identify initially not having a permit as deficient. The initiator also recommended closing the CAP to trending versus evaluating the problems further.

Analysis: Failing to identify scaffolding without an appropriate Combustible Material/Flammable Liquid Control permit for a period of 231 days was a performance deficiency. Specifically, both the Fire Plan and procedure ACP 1412.2 indicated that the Fire Marshall was responsible for performing periodic inspections to minimize the amount of combustibles. The finding was greater than minor in accordance with IMC 0612, "Power Reactor Inspection Reports," Appendix B, "Issue Disposition Screening," issued on May 19, 2005, because failure to identify large quantities of combustible materials, if uncorrected, would result in a more safety significant concern. The finding also affected the Mitigating Systems Cornerstone attribute for protection against external factors, because a fire involving scaffolding materials could affect nearby cable trays. Those cable trays contained cables important to safety, and a fire increased the probability that a safety function would be challenged. In addition, the finding affected the cross-cutting area of Human Performance because performing periodic inspections to minimize combustibles was one of the responsibilities of the Fire Marshal.

The inspectors then completed a significance determination of this issue using IMC 0609, Appendix F, Attachment 2, "Degradation Rating Guidance Specific to Various Fire Protection Program Elements." The inspectors determined that the unapproved presence of wood scaffolding material was a low degradation finding against the combustible controls program because wood will not cause a fire from existing sources of heat or electrical energy. Question 1 of IMC 0609, Appendix F, Task 1.3.1, "Qualitative Screening for All Finding Categories," showed that the finding was Green, a finding of very low safety significance due to the low degradation rating.

Enforcement: License condition 2.C.(3) required NMC to implement and maintain in effect all provisions of the approved fire protection program as described in the DAEC Final Safety Analysis Report (FSAR). The Updated FSAR described the fire protection program as contained in the Fire Plan and was incorporated into the Updated FSAR by reference. Section 4.10 of the Fire Plan gave the Fire Marshal the responsibility for conducting periodic inspections to minimize combustibles within the owner-controlled area. Section 6.1 of the Fire Plan referenced administrative control procedure ACP 1412.2, assigning inspection responsibility to the Fire Marshal, to assure transient

combustibles were located, used, and documented. ACP 1412.2 also defined wood as a class "A" material, and required a Combustible Material/Flammable Liquid Control permit for bringing over 100 pounds of such material into the power block. Contrary to the above, on May 27, 2005, the NRC identified wood scaffolding material exceeding 100 pounds that had been in place in the motor-generator set room of the reactor building for 231 days without the required permit. Once identified, the licensee initiated CAP036606, quantified the materials in the fire zone, and initiated a permit. Because this violation was of very low safety significance and entered into the licensee's corrective action program, this violation is being treated as an Non-Cited Violation (NCV), per Section VI.A of the NRC Enforcement Policy. (NCV 05000331/2005009-01)

b. Prioritization and Evaluation of Issues

(1). Inspection Scope

The inspectors reviewed several attributes of the licensee's significance classification and evaluation from a sample of licensee initiated CAPs. These attributes included assigned CAP significance category, and adequacy of safety analysis, operability reviews, or reportability determinations, as applicable. Other attributes examined were apparent cause evaluations, condition evaluations, evaluations for previously issued NRC Non-Cited Violations (NCVs), and appropriateness of assigned corrective actions. Specific documents reviewed are listed in the attachment.

(2). Assessment

The inspectors concluded that most issues were appropriately prioritized and adequately evaluated. However, the inspectors identified examples where issues would have been more appropriately classified at a higher significance level, warranting a more in-depth evaluation. The inspectors also noted several weaknesses with respect to evaluation of issues. Some specific observations are discussed below.

.1 Prioritization and Significance Levels

- The licensee documented an adverse trend in surveillance test program controls with CAP029606 as the result of four related CAPs that occurred in a previous 30 day period. The problems identified in the underlying CAPs were: (1) a surveillance test procedure (STP) had missing steps, (2) a technical specification (TS) surveillance interval was missed, (3) an STP was incorrectly issued, and (4) a main steam isolation valve (MSIV) valve functional test nearly missed its 'drop dead' due date. Significance levels on two of the specific issue CAPs were classified as "B", while the remaining specific issue CAPs and the trend CAP were given "C" significance levels.

  The inspectors reviewed the corrective action program guidance described in procedure ACP 114.5, "Action Request System," and Nuclear Management Company (NMC) procedure FP-PA-ARP-01, "Action Request Process." Based on this review, the inspectors questioned whether the trend CAP should have been evaluated at a higher significance level. In response, the licensee did not justify the existing "C" significance level and stated that it would likely be given a "B" classification under the current action request program.

- The licensee documented per CAP032916 that a post-STP valve lineup was not performed in a timely manner and could have resulted in missing a technical specification limiting condition for operation (TS LCO). Since all valves were correctly aligned already when the lineup was performed, there was no consequence. For this reason, the CAP was assigned a "C" significance level and closed to trend without any further evaluation.

  When questioned why the CAP was not evaluated at a higher significance level based on guidance from procedures FP-PA-ARP-01 and ACP 114.5, the licensee offered no explanation beyond the fact that there was no consequence in this instance. What was not evaluated further were specific causes of the problem or how to correct it.

- An adverse trend in Operations Department procedure usage was noted in CAP025653 and given a "B" significance level, requiring an ACE to be performed. Subsequently, the requirement to perform an ACE was appealed and downgraded by the screening team without any documented reasoning. As a result, a condition evaluation (CE) was performed and the ACE deleted. It was stated in the CAP that procedure quality was not an issue, and that use of procedures caused the deficiencies. This resulted in a white paper on expectations for procedure use in the Operations Department dated 03/10/2003 to be written and presented at an Operations Department all hands meeting.

  When questioned about how this CAP was processed, the licensee observed that while a "B" significance level usually required an ACE, program flexibility allowed exceptions to be made when appropriate. However, providing no justification for the decision and deleting the ACE were considered unusual. The inspectors noted that while the white paper addressed management approvals needed to mark steps N/A, no supporting procedural requirement was found. Therefore, the inspectors questioned if a more in-depth evaluation might have identified the need for procedure changes. The need for more rigor in analysis became apparent when a March 2005 operations procedure event occurred that delayed establishing shutdown cooling (SDC) for six hours during a plant cooldown.

.2 Evaluation of Issues

- When Rod Block Monitor (RBM) STP 3.3.2.1-02 was performed with improper test equipment, CAP031552 was written, requiring ACE001366 to be prepared. While the ACE had an adequate event description, it included parts of other standard ACE elements within it. Specifically, contributing factors and extent of condition were included but were not addressed completely. In addition, the extent of condition assessment stated that RBM surveillances were thoroughly researched for similar discrepancies, but did not address similar conditions for other surveillance types.

  The apparent cause statement section primarily addressed human performance aspects of the problem, and served as a statement of guilt rather than on objectively addressing all causes of the problem. Though briefly mentioned, it did not address schedule pressure adequately, for example. This carried over when addressing required corrective actions, by not addressing schedule pressure or inadequate time given to perform surveillances. Corrective actions to prevent recurrence (CATPRs), on the other hand, only addressed improving the pre-job briefing sheet and that required test

equipment was not specifically addressed in the STPs. In summary, the focus on punishing the technicians' human performance errors resulted in contributing causes being neglected and limited the effectiveness of this ACE.

- An operator error caused a delay in establishing shutdown cooling, and resulted in CAP035443. The CAP evaluation required ACE001441 to be written, which focused on the human performance deficiencies and the delay it caused. Generic categories not adequately addressed were management oversight, planning, procedures and work practices. Due to the limited focus, the only documented corrective actions were coaching the operator, assigning a corrective action (CA) to develop guidance for N/Aing procedure steps, and developing a "Lessons Learned" for Noble Metals Chemical Addition (NMCA) venting. In spite of this, a procedure change to OI 149, Residual Heat Removal, due to "too many N/Aed steps resulting in confusion" was written, though no problems with this procedure were addressed in the ACE.

  Also not addressed was that the conduct of operations fleet procedure, FP-OP-COO-01, required place keeping be done sequentially and not in advance. In addition, while ineffective peer checking was identified as a contributing cause, it was only a white paper expectation to have supervisory or peer review since no procedural requirement existed. While human performance was clearly an issue, specific requirements for supervisory review of N/Aing steps, rather than just being "strongly encouraged," may have prevented the error.

.3 Operating Experience

- OE001525, from a 2004 Kewaunee assessment by the Institute of Nuclear Power Operators (INPO), described cases where ACE's only determined the direct causes of an event and therefore only addressed immediate problems. The licensee's analysis determined that the OE applied because DAEC used the same ACE evaluation manual, however, in reviewing a sample of ACEs determined that the problem was not occurring at DAEC. Further, it was determined that Kewaunee's specific problems, management oversight and poor understanding of the CAP process, were being addressed at DAEC.

  Based on the review of the inspectors, examples of narrowly focused evaluations were identified, such as those documented in the "Evaluation of Issues" examples above. Further examples included ACE001102, where a broken Bendix connector cable caused a radiation monitor inoperablity and an unplanned LCO entry. This ACE had no apparent cause and therefore no corresponding CATPR, even though an "inherent flaw" and a "design limitation" were mentioned. The corrective action taken was to repair the connector. ACE001307 was another similar example. Here, an Average Power Range Monitor (APRM) circuit was made inoperable due to a short in a Local Power Range Monitor (LPRM) circuit. Again, no apparent causes or CATPRs were identified and the corrective action specified was to troubleshoot, repair, and post-test the count circuit for the "D" APRM. These examples, among others, caused the team to question the licensee's conclusions for this OE's significance to DAEC.

(3). Findings

No findings of significance were identified.

c. Effectiveness of Corrective Actions

(1). Inspection Scope

The inspectors reviewed selected CAPs and their associated corrective actions to evaluate the effectiveness of the corrective actions. The inspectors also reviewed CEs, ACEs, RCEs, and operability determinations to verify that corrective actions were identified and implemented in a timely manner. These reviews included corrective actions to address long-standing or repetitive issues. The team also verified the continued implementation of a sample of completed corrective actions. The samples that were selected for review were based, in part, on the safety and risk significance of the issues. The inspectors reviewed the licensee's corrective actions for NCVs documented in NRC inspections and evaluated the effectiveness of corrective actions from January, 2003. Documents reviewed are listed in the attachment.

(2). Assessment

The team noted that most corrective actions were appropriately implemented, and that in general, the licensee used the corrective action process to document instances where previous corrective actions were ineffective or inappropriate. However, two findings of very low safety significance (Green) were identified where corrective actions were not implemented effectively. The specific observations and findings are discussed below.

(3). Findings

.1 Untimely Corrective Actions for Degraded Fire Barriers

Introduction: The inspectors identified an NCV of a fire protection license condition having very low safety significance (Green) for failing to take prompt corrective actions to correct three fire barrier deficiencies.

Description - Reactor Building Floor Penetration Seal: Penetration seal 03A-F1-14 was for a penetration between the first (fire area RB1) and second floors (fire area RB2) of the reactor building approximately three feet by six feet in size. The penetration seal was required to provide three hours of fire endurance protection for four cable trays. In response to a self-assessment in preparation for an NRC triennial fire protection inspection, on September 13, 2002, licensee personnel identified that the configuration for this penetration was not bounded by a fire test. The penetration was declared inoperable and hourly fire watches were initiated accordingly. The non-conforming penetration fire barrier was destructively removed on September 9, 2003, so that design work could be performed for replacing the penetration.

Removal of the penetration resulted in an approximate four by six foot opening left in the second floor of the reactor building. The design of the non-conforming penetration was evaluated by FPE-P04-001, Evaluation of Cable Tray Blockout Between El. 757 and El. 786 Reactor Building, dated January 30, 2004. Design details for a replacement penetration were outlined in Engineering Evaluation of EMA: A67767, dated March 9, 2004. However, funding approval for replacing the penetration did not occur until March 31, 2005, and at the time of this inspection, the licensee had not completed

the engineering work required by the modification process. Therefore, the inspectors concluded that the delays amounted to untimely corrective action.

Description - Ventilation Fire Damper: Ventilation fire damper 1V-FD-034 was located between the battery room corridor (fire area CB4), outside the essential switchgear rooms, and the ventilation chase to the control room HVAC room (fire area CB1). This ventilation fire damper was required to provide three hours of fire endurance protection. On February 18, 2003, the damper was identified as failing to completely close during surveillance testing and CAP025688 was initiated. Through troubleshooting, licensee maintenance personnel found that the damper stopped approximately 2 inches short of 18 inches of full travel. At the time of this inspection, the licensee was still evaluating replacement options and had not yet initiated procurement of a replacement damper assembly. The inspectors concluded that this delay represented untimely corrective action.

Description - High Pressure Coolant Injection Pump Room Fire Barrier: Penetration seal 01E-E-4 was a three-hour fire barrier between the high pressure coolant injection (HPCI) pump room (fire area RB1) and turbine building basement (fire area TB1). The fire barrier was of a cellular concrete material which surrounded a 3-inch steam pipe penetrating the wall. The nominal thickness of the fire barrier was 6 inches. On August 27, 2003, the penetration was identified as being degraded during a fire barrier surveillance in that there was a some damage to the penetration on the HPCI room side. Discussions with licensee personnel indicated that the greatest obstacle for repairing this fire barrier was the necessity to erect scaffolding to reach it. During this inspection, the licensee started to erect the necessary scaffolding to reach the barrier and performed additional inspections to determine the extent of degradation. Licensee engineering personnel determined that the damage was limited to three spauled areas up to 1.5 inches deep and some cracks with widths less than 1/16 inch. No through cracks or voids were detected. As such, licensee engineering personnel concluded that the fire barrier had a minimum thickness of at least 4.5 inches and that the barrier would provide, at a minimum, a 2-hour fire endurance rating. The inspectors concluded that the delay in repairing the fire barrier represented untimely corrective action.

Analysis - General: The inspectors determined that these failures to take timely corrective actions were performance deficiencies which warranted a significance evaluation. The inspectors concluded that the finding was greater than minor in accordance with IMC 0612, Appendix B, because the finding affected the protection against external factors (fire) attribute of the Mitigating Systems Reactor Safety Cornerstone because fire barriers used to mitigate the effects of fire were degraded. The finding also affected the cross-cutting area of Problem Identification and Resolution because corrective actions were not implemented in a timely manner. The inspectors completed a significance determination of this issue using IMC 0609, Appendix F, for each fire barrier issue as described below.

Analysis - Reactor Building Floor Penetration Seal: Based on review of Table A2.2, “Guidance for Ranking an Observed Fire Barrier Degradation Finding Based on the Type of Barrier system Against Which the Degradation Has Been Noted,” of IMC 609, Attachment 2, the inspectors determined that barrier degradation level was high because greater than 50 percent of the required barrier depth had been removed. Per

IMC 0609, Appendix F, Step 2.2, “Fire Damage State Determination,” the inspectors determined that development of a fire damage state scenario was necessary.

The large area of the reactor building, high ceiling height, and a large hatch opening in the same floor, would make it difficult to develop a hot gas layer which affected the cables going through the opening left by the removed penetration seal. Above the opening, there were ignition sources which could potentially affect the cables, however, the inspectors concluded that it was not credible for a fire to spread downward through the opening.

The inspectors noted that Section 9.5.1.2.8 of the Updated FSAR stated that the electrical cables used in the plant consist mainly of ethylene-propylene insulation with a neoprene jacket. Section A.4.2 of NUREG-1805, “Fire Dynamics Tools (FDTs), Quantitative Fire Hazard Analysis Methods for the U.S. Nuclear Regulatory Commission Fire Protection Inspection Program,” issued December 2004, stated ethylene propylene rubber and neoprene materials were thermoset materials. Below the opening, there were no ignition sources within the Ball and Column Zone of Influence for thermoset cables as described in Table 2.3.2 of IMC 609 Appendix F for a 200 kilowatt fire. Attachment 5, “Characterizing Non-Simple Fire Ignition Sources,” of IMC 609 Appendix F stated self-ignited cable fires are considered plausible for non-qualified thermoset cables. Section 9.5.1.2.8 of the Updated FSAR stated that the flame test standard for cables was not in effect at the time these cables were purchased and installed at the facility. Therefore, although the cables were of thermoset materials, the cables were considered non-qualified and were required to be considered a potential ignition source.

The inspectors considered the following fire scenario:

- A fire originates in the cables which pass through the penetration seal opening. The origin of the fire is within the first floor of the reactor building (fire area RB1). The origin of the fire is conservatively assumed to be located directly beneath the penetration seal opening. As such, no time delay is assumed for the fire to travel horizontally.

- The fire is assumed to be detected within one minute due to smoke detectors located within the reactor building.

- The fire travels vertically upward along the cable trays through the penetration seal opening into the reactor building second floor area (fire area RB2). The rate that the fire travels is conservatively assumed to be instantaneous. As such, no time delay is assumed for the fire to travel horizontally.

- The inspectors and licensee engineering personnel verified that no mitigation equipment was located within the radial zone of influence for a 200 kilowatt fire involving the vertical run of cables. The nearest equipment was one reactor building closed cooling water pump, however, the pump was approximately 3.5 feet away from the nearest involved cable tray which exceeded the radial zone of influence for both thermoplastic and thermoset cables.

- The fire travels horizontally along a cable tray which branches off of one of the involved vertical cable trays. The fire travels approximately 17 feet before coming within the zone of influence to affect cables unique to fire area RB2 (versus cables which were also within fire area RB1). Per IMC 609F, Attachment 3, "Guidance for Identifying Fire growth and Damage Scenarios," the inspectors determined that it would take 102 minutes, based on a fire spread rate of 10 feet per hour, before cables unique to fire area RB2 would be within the zone of influence. The inspectors conservatively assumed that the cables unique to fire area RB2 would be affected instantly once the fire was located below the affected cable tray and time to damage was also 102 minutes.

Step 2.9, "Quantification and Preliminary Significance Determination," of IMC 609F described the formula for determining preliminary significance determination as:

$$\Delta CDF = DF \times F \times SF \times AF \times PNS \times CCDP$$

where for this fire scenario:

ΔCDF	$= 8.2 \times 10^{-12}$	Estimated risk contribution for the fire scenario. The value of 8.2×10^{-12} per year was obtained from the product of the factors listed below.
DF	= 1	Duration factor. Since the condition associated with this finding existed for more than 30 days, the duration factor is 1.
F	$= 4.8 \times 10^{-4}$	Fire frequency. Based on review of IMC 609, Attachment 4, "Fire Ignition Source Mapping Information: Fire Frequency, Counting Instructions, Applicable Fire Severity Characteristics, and Applicable Manual Fire Suppression Curves," the inspectors determined that the fire frequency for this scenario was 4.8×10^{-4} per year based on a medium loading of non-qualified cables.
SF	= 1	Severity factor. The inspectors conservatively assumed the severity factor to be 1.
AF	= 1	Ignition source specific frequency adjustment factor. For this scenario, the ignition source specific frequency adjustment factor is 1 because the finding did not involve the fire prevention and administrative controls finding category.
PNS	$= 1.7 \times 10^{-8}$	Probability of non-suppression. Based on review of IMC 609, Appendix F, Task 2.7.3, "Plant Personnel and the Manual Fire Brigade," the inspectors determined that probability of non-suppression was 1.7×10^{-8} using the formula below: $PNS_{manual} = e^{(-8 \times t)}$ where:

8 = 0.177 Mean Rate Constant. The value for the Mean Rate Constant was based on the value for cable fires from Table 2.7.1, "Non-suppression Probability Values for Manual Fire Fighting Based on Fire Duration (Time to Damage after Detection) and Fire Type Category," of IMC 609, Appendix F.

t = 101 Fire duration time (time to damage after detection) in minutes.

CCDP = Conditional core damage probability. For this fire scenario, the inspectors conservatively assumed that the conditional core damage probability was 1 because the inspectors did not determine what specific cables would be affected by this scenario.

Based on review of Table 2.9.1, "Risk Significance Based on **)** CDF," of IMC 609, Appendix F, the inspectors determined that finding screened to Green (i.e., a finding of very low safety significance) because the estimated risk contribution was less than 1×10^{-6} per year.

Analysis - Ventilation Fire Damper: Per Table A2.2, "Guidance for Ranking an Observed Fire Barrier Degradation Finding Based on the Type of Barrier system Against Which the Degradation Has Been Noted," of IMC 609, Attachment 2, the inspectors determined that the barrier degradation level for the damper was a "moderate B" level of degradation. This was because, although the damper failed to close greater than 90 percent, the damper was located in steel duct work. As such, the damper could be credited for one hour.

The inspectors determined that the only ignition sources located within the battery room corridor were electrical cables and transient combustibles. Therefore, the damper would not be subject to direct flame impingement due to its locations within steel duct work and the location the cable trays within the room. Based on review of Task 2.2.2, "Screening Assessment for FDS3 Scenarios," question 7, of IMC 609, Appendix F, there was not a credible fire scenario because the damper would provide a minimum of 20 minutes fire endurance protection and the damper would not be subject to direct flame impingement. On this basis, the inspectors determined that the finding screened to Green, a finding of very low safety significance.

Analysis - High Pressure Coolant Injection Pump Room Fire Barrier: Based on review of Table A2.2, of IMC 609, Attachment 2, the inspectors determined that barrier degradation represented a "Moderate A" level of degradation because the cellular concrete fire barrier provided a minimum 4.5-inch thickness. As such, the fire barrier was determined to provide a minimum of a 2-hour fire endurance rating. Based on review of Task 2.2.2, question 1, of IMC 609, Appendix F, the inspectors determined that there was not a credible fire scenario because the fire barrier provided a minimum of a 2-hour fire endurance rating and the finding screened to Green, a finding of very low safety significance.

Enforcement: License condition 2.C.(3) required the licensee to implement and maintain all provisions of the approved fire protection program as described in the FSAR for the DAEC. Section 13.7.1 of the Updated FSAR for DAEC stated that an overall description of the fire protection program was contained in the DAEC Fire Plan and was incorporated by reference into the Updated FSAR. The DAEC Fire Plan, Section 9.1, Volume 1, stated that the implementation of the Quality Assurance (QA) program assured that fire protection systems and features listed under "Operability Requirement" will meet the QA requirements implemented by the DAEC QA Manual. DAEC QA Manual, Section 14, Corrective Action, stated, that the corrective action program is established to ensure that conditions adverse to quality are promptly identified, reported, and corrected. Contrary to the above, conditions adverse to quality associated with degraded fire barriers were not promptly corrected in that, as of June 10, 2005:

(1) penetration seal 03A-F1-14 which had been identified as degraded since September 13, 2002, had not been corrected;

(2) ventilation fire damper 1V-FD-034 which had been identified as degraded since February 18, 2003, had not been corrected; and

(3) penetration seal 01E-E-4 had been identified as degraded since August 27, 2003, had not been corrected.

Once these issues were identified, the licensee entered the issues into its corrective action program as CAP000607, CAP036594, and CAP036811. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy. (NCV 05000331/2005009-02)

.2 Untimely Corrective Actions for Potential for Smoke in the Control Room:

Introduction: The inspectors identified an NCV of 10 CFR Part 50, Appendix B, quality assurance requirements having very low safety significance (Green) for failing to take prompt corrective actions to correct identified procedural deficiencies with respect to the potential for smoke in the control room.

Description: On May 26, 1998, the licensee initiated CAP001628 to address identified issues regarding the potential for smoke to enter the control room during a fire event due to shared ductwork. As corrective action, the licensee revised AOP 913, Fire, on January 4, 1999, which directed operators to shutdown the ventilation system fans which supplied air to the control room.

During a triennial fire protection conducted in February 2003, as documented in Inspection Report 05000331/2003002, the NRC identified several problems with the changes made to AOP 913 in 1999. On February 14, 2003, the licensee placed the issue in their corrective action program under CAP025619. Specifically:

(1) smoke could still migrate to the control room due to the common ductwork,

(2) area fire plan procedures conflicted with AOP 913,

(3) operators were not directed to shutdown the ventilation fans for the computer room adjacent to the control room, and

(4) no effective means was provided for cooling the control room.

On February 17, 2003, the licensee issued revision 33 to AOP 913. This revision made interim procedural changes to shutdown ventilation systems, including the computer room, which could cause smoke to enter the control room. In addition, changes were made to provide separate ventilation to the control room by opening doors to the outside and using a portable fan. However, these changes did not ensure that the main portions of the control room would be ventilated. Specifically, the changes provided only for temporary ventilation into and an exhaust path from the shift manager's office. The flow path was through the Control Room HVAC room and out a roof access door, but the shift manager's office was separated from the main portions of the control room by glass windows and doors. Even if the access doors were opened, there was no provision to circulate air between the shift manager's office and the other spaces. Although this represented an improvement, AOP 913 still did not provide for effective ventilation and cooling of main portions of the control room.

In response to the corrective action issues identified by the NRC, the licensee performed apparent cause evaluation ACE001065 to determine the reasons why the corrective actions taken in response to CAP001628 were not effective. The inspectors identified weaknesses associated with the ACE. Specifically, the ACE was performed with a low degree of independence because the individual performing it was also responsible for initiating the CAP corrective actions. Although the ACE provided some insight to the individual's thoughts when addressing the CAP, it provided little insight regarding contributing causes. Due to the uncertainty associated with the cause, no corrective action was prescribed to address the previous failure to take effective corrective actions.

The licensee then contracted with a consultant to review the smoke intrusion issue. This review was documented in Proto-Power Corporation Engineering Evaluation 04-E09, Evaluation of Control Room Habitability for Toxic Gas and Smoke Events in Response to NRC Generic Letter 2003-01, Revision A, dated September 3, 2004. The review recommended that all doors be opened and an electric portable fan placed in the control room area to aid ventilation, however none of the recommendations had been implemented at the time of this inspection. Based on discussions with licensee engineering personnel, the inspectors determined that procedure changes had been drafted and partially reviewed, but were not being actively pursued until after the inspectors questioned their progress. The licensee had established a due date of June 30, 2005, for these procedure changes, however, given the problems with interim procedure changes made in 2003, the inspectors determined that the progress was inadequate.

Analysis: The inspectors determined that the failure to take timely corrective actions was a performance deficiency warranting a significance evaluation. The finding was greater than minor in accordance with IMC 0612, Appendix B, because it affected the protection against external factors (fire) attribute of the Mitigating Systems Reactor Safety Cornerstone because smoke in the control room could hinder the operators

ability to shutdown the plant. This finding also affected the cross-cutting area of Problem Identification and Resolution because corrective actions were not implemented in a timely manner.

The inspectors performed a significance evaluation using IMC 609, Appendix F. Using the guidance of Table A2.3 of IMC 0609, Appendix F, the finding was a post-fire safe shutdown finding with a low degradation - with the ventilation system shutdown, smoke intrusion into the control room would be limited. In addition, self-contained breathing apparatus were readily available within the control room and operators were trained in their use. Based on review of IMC 0609, Appendix F, Task 1.3.1, question 1, the inspectors determined that the finding screened to Green, a finding having very low safety significance, due to the low degradation rating.

Enforcement: 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," requires that measures be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. A condition adverse to quality was identified on February 16, 2003, in that previous corrective actions to procedure AOP 913 were ineffective in addressing the previously identified potential for smoke to enter the control room. Contrary to the above, as of June 10, 2005, effective corrections to procedure AOP 913 had not yet been completed in that procedure AOP 913 did not have provisions for adequate ventilation of the control room in the event of smoke intrusion. Once identified, the licensee placed this issue in their corrective action program under CAP0036700. Because this violation was of very low safety significance and it was entered into the licensee's corrective action program, this violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy. (NCV 05000331/2005009-03)

d. Assessment of Safety-Conscious Work Environment

(1). Inspection Scope

As part of the Identification and Resolution of Problems inspection scope, the inspectors interviewed six members of the plant staff to assess the establishment of a safety conscious work environment (SCWE) at the DAEC. In this context, a SCWE refers to an environment in which employees feel free to raise safety concerns, both to their management and to the NRC, without fear of retaliation. The typical interview questions were similar to those listed in the appendix, "Suggested Questions for Use in Discussions with Licensee Individuals Concerning PI&R [Problem Identification and Resolution] Issues," to NRC Inspection Procedure 71152. During interviews, document reviews and observations of activities relevant to the Identification and Resolution of Problems inspection, the inspectors looked for evidence that suggested plant employees were reluctant to raise safety concerns.

(2). Assessment

The individuals interviewed indicated they were not hesitant to identify safety concerns. Also, the inspectors saw no evidence during the inspection that suggested plant employees were reluctant to raise safety concerns.

(3). Findings

No findings of significance were identified.

4OA5 Other Activities

.1 Unresolved Item 05000331/200300203, Acceptability of Epoxy Floor Covering (Closed): The inspectors questioned the acceptability of epoxy floor coverings which had thicknesses in excess of those considered interior finishes. During this inspection, the inspectors reviewed the licensee's evaluations in response to CAP025540 and noted that the licensee had used three different epoxy coatings at the DAEC facility. The two most prevalent met the definition of a noncombustible material as defined by NRC Generic Letter (GL) 86-10 Supplement 1, "Fire Endurance Test Acceptance Criteria for Fire Barrier Systems Used to Separate Redundant Safe Shutdown Trains Within the Same Fire Area," dated March 25, 1994, due to their relatively low flame spread rating. The third coating had a relatively high reported flame spread rating, in excess of 50, thereby not meeting the GL definition of a noncombustible material.

The licensee determined that there were no adjacent fire areas having the relatively high reported flame spread rating and the inspectors concluded that the coatings would not contribute towards the spread of a fire from one fire area to another. As discussed in the licensee's July 25, 2003, response to this unresolved item, licensee engineering staff determined that the additional combustible loads due to epoxy floor coatings did not present a challenge to the DAEC fire barriers.

The inspectors noted two areas of the DAEC facility relied upon areas having no intervening combustibles to prevent the spread of fire. The first area was the torus room, where the licensee determined that the coatings applied were of a brand having a relatively low flame spread rating. In addition, thickness measurements taken by the licensee indicated that the floor coatings in the torus room were less than 0.125 inches, thereby meeting the GL 86-10 Supplement 1 definition of a noncombustible. The second was the 747-foot elevation of the pump house, where the licensee did not have any specific information. However, the licensee did have coating information for the 727-foot and 761-foot elevations of the pump house indicating that the coatings for those elevations were of a brand having a relatively low flame spread rating. In addition, thickness measurements taken by the licensee indicated that the floor coatings at the 747-foot elevation of the pump house were less than 0.125 inches, and the average of the three measurements was 0.040 inches. Based on this information, the inspectors concluded that there was reasonable assurance that the coatings within the 747-foot elevation of the pump house met the definition of a noncombustible material. Based on this information, the inspectors concluded that the applied coatings were acceptable and that this unresolved item could be closed.

4OA6 Management Meetings

Exit Meeting Summary

The inspectors presented the inspection results to licensee management in an exit meeting on June 10, 2005. Licensee management acknowledged the potential findings presented and indicated that no proprietary information was provided to the inspectors.

ATTACHMENT: SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee
G. Van Middlesworth, Vice President for Fleet Optimization
M. Peifer, Site Vice President
J. Bjorseth, Site Director
W. Bentley, Assistant Operations Manager
S. Catron, Regulatory Affairs Manager
D. Curtland, Plant Manger
M. Fairchild, Regulatory Affairs
S. Haller, Site Engineering Director
P. Hansen, Outage and Scheduling Manager
J. Kuehl, Engineering Programs Supervisor
R. Murrell, Regulatory Affairs
K. Schneider, Nuclear Oversight Manager
D. Miller, Employee Concerns Program Manager
C. Rushworth, Regulatory Affairs Senior Engineer
C. Narhi, Fire Protection Engineer
R. McClain, Site Fire Marshall

Nuclear Regulatory Commission
B. Burgess, Chief, Projects Branch 2

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000331/2005009-01	NCV	Failure to Identify Transient Combustibles
05000331/2005009-02	NCV	Untimely Corrective Actions for Degraded Fire Barriers
05000331/2005009-03	NCV	Untimely Corrective Actions for Smoke in the Control Room

Closed

05000331/2003002-03	URI	Acceptability of Epoxy Floor Covering
05000331/2005009-01	NCV	Failure to Identify Transient Combustibles
05000331/2005009-02	NCV	Untimely Corrective Actions for Degraded Fire Barriers
05000331/2005009-03	NCV	Untimely Corrective Actions for Smoke in the Control Room

Discussed

None.

LIST OF ACRONYMS USED

ACE	Apparent Cause Evaluation
ACP	Administrative Control Procedure
AR	Action Request
AOP	Abnormal Operating Procedure
CA	Corrective Action
CAP	Corrective Action Program
CARB	Corrective Action Review Board
CATPR	Corrective Action to Prevent Recurrence
CE	Condition Evaluation
CFR	Code of Federal Regulations
CR	Condition Report
DAEC	Duane Arnold Energy Center
DRP	Division of Reactor Projects
FSAR	Final Safety Analysis Report
IMC	Inspection Manual Chapter
GL	Generic Letter
HPCI	High Pressure Coolant Injection
IR	Inspection Report
ISFSI	Independent Spent Fuel Storage Installations
LCO	Limiting Condition for Operation
LPRM	Local Power Range Monitor
N/A	Not Applicable
NCV	Non-Cited Violation
NMC	Nuclear Management Corporation
NMCA	Noble Metals Chemical Addition
NOS	Nuclear Oversight
NRC	Nuclear Regulatory Commission
OE	Operating Experience
QA	Quality Assurance
RBM	Rod Block Monitor
RCE	Root Cause Evaluation
RFO	Refueling Outage
RHR	Residual Heat Removal
RHRSW	Residual Heat Removal Service Water
SCBA	Self Contained Breathing Apparatus
SCWE	Safety Conscious Work Environment
SDC	Shutdown Cooling
SDP	Significance Determination Process
SMART	System Monitoring and Reporting Tool
SPDS	Safety Parameter Display System
STP	Surveillance Test Procedure
TS	Technical Specification
URI	Unresolved Item

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, rather that selected sections of portions of the documents were used 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 stated in the body of the inspection report.

Analyses

Proto-Power 04-E09; Evaluation of Control Room Habitability for Toxic Gas and Smoke Events in Response to NRC Generic Letter 2003-01; Revision A

Calculations

CAL-M04-011; HPCI Booster Pump Low Suction Pressure Setpoint - PS2304B

Corrective Action Documents

ACE001039; Apparent cause evaluation for CAP025390; dated February 2, 2003

ACE001065; Apparent cause evaluation for CAP001628 and OTH001790; dated March 11, 2003

ACE001102; Apparent cause evaluation for CAP026190; dated March 18, 2003

ACE001307; Apparent cause evaluation for CAP029600; dated October 31, 2003

ACE001366; Apparent cause evaluation for CAP031552; dated May 8, 2004

ACE001380; Apparent cause evaluation for CAP032377; dated July 22, 2004

ACE001406; Apparent cause evaluation for CAP033872; dated November 16, 2005

ACE001411; Snapshot Assessment 2575 identified a potential concern with DAEC CAP program for trends; dated November 29, 2004

ACE001441; Apparent cause evaluation for CAP035443 and CA040143; dated March 30, 2005

CA027438; Corrective action for CAP026965 and OTH036422; dated April 14, 2003

CA040143; Corrective action for CAP035443; dated April 27, 2005

CE000465; Condition evaluation for CAP025653; dated February 16, 2003

CE001329; Condition evaluation for CAP029606; dated October 31, 2003

CAP001628; Potential for smoke entering Control Room during fire event; dated May 26, 1998

CAP019302; Documents not maintained in accordance with QA program requirements at the Emergency Response Facilities; dated May 14, 2002

CAP025390; RPS Test Box Failure During STP 3.3.1.1-06 Caused Half SCRAM; dated February 2, 2003

CAP025540; Epoxy floor coating not considered interior finish; dated February 11, 2003

CAP025619; Inadequate Corr Actions - Response to Smoke in the Control Room; dated February 14, 2003

CAP025621; Effectiveness of Corrective Action Process; dated February 14, 2003

CAP025653; Negative Operations dept. Procedure Usage and Adherence Trend; dated February 16, 2003

CAP026190; Rad Monitor RIM9185A Inoperable Causing Unplanned LCO Entry; dated April 23, 2003

CAP026965; STP 3.6.1.1-07 Needs Revised; dated April 14, 2003

CAP029369; Not all Steps of STP NS810001 (refueling Operations Platform Inspection) Performed; dated October 13, 2003

CAP029600; “D” APRM was Declared Inoperable due to Count Circuit Only Sees 10 LPRMs; dated October 31, 2003

CAP029606; Recent (past 30 days) Adverse Trend in Surveillance Test Program Controls; dated October 31, 2003

CAP030663; HPCI Booster Pump Suction Low Pressure Instrument Pipe Venting; dated February 9, 2004

CAP030954; Cleanliness criteria for heat exchanger visual inspection; dated March 9, 2004

CAP031552; STP 3.3.2.1-02 Performed with Wrong Test Equipment; dated May 8, 2004

CAP032150; Internal OE - Potential Missile Hazards in the OCA and Switchyard Areas; dated June 30, 2004

CAP032377; “B” RHRSW Leak Upstream of V13-0004; dated July 22, 2004

CAP032916; Post STP Completion Valve Lineup Not Performed When STP was Completed; dated September 7, 2004

CAP033860; Snapshot Self-Assessment of DAEC Corrective Action Processes; dated November 16, 2004

CAP033872; Non Code Repair Performed on 1VAC015 Without Prior NRC Approval; dated November 16, 2004

CAP034018; Snapshot Assessment 2575 identified a potential concern with DAEC CAP program for trends; dated November 23, 2004

CAP035443; Delay in SDC, dated March 28, 2005

CA039372; Snapshot Assessment 2575 identified a potential concern with DAEC CAP program for trends; dated December 6, 2004

CA039508; Snapshot Assessment 2575 identified a potential concern with DAEC CAP program for trends; dated December 21, 2004

EFR036353; INPO AFI SE.1-1 Insufficient Management Oversight of the Corrective Action Program - Learning Organization Self-Assessment; dated June 16, 2004

OTH026849; Governing regulations and industry standards for epoxy floor coatings; dated March 11, 2003

OTH028401; INPO OE16403, Reactor Steam Dryer Found Damaged at Quad Cities Unit 2; dated June 23, 2003

OTH001253; OE17282 - Preliminary Notification - Foaming of the Emergency Diesel Engine Oil at Calvert Cliffs; dated December 2, 2003

OTH001265; OE17397 - Colt-Fairbanks Morse Supplied Wrong Gasket for EDG Lube Oil Suction Strainer Pipe Couplings; dated December 15, 2003

OTH001481; INPO OE18531, Unusual Breaker Aging Mechanism Causes Failure of Class 1E Inverter; dated June 16, 2004

OTH038388; Internal OE - Potential Missile Hazards in the OCA and Switchyard Areas; dated July 6, 2004

OTH001683; OE18796, Steam Dryer Hood Crack; dated August 5, 2004

OTH002183; Add the CRD Quick Disconnects for HCU Charging to the Hose Control Procedure; dated October 13, 2004

OTH005555; Site Implementation of Fleet Procedure FP-G-DOC-03; dated May 3, 2005

RCE000217; AR30940, Root Cause Analysis Report, Document Control - Emergency Response Facility (ERF) Procedures; dated December 18, 2002

RCE000223; CAP020061, ‘A’ RHRSW Strainer High DP While Running ‘A’ and ‘C’ RHRSW pumps; dated August 6, 2002

Corrective Action Documents Initiated as a Result of Inspection
CAP000607; FP-PA-ARP-01 Attachment 1 Fire Protection Issue; dated May 25, 2005

CAP036594; NS13F001 - Fire Barrier Penetration Seal Inspection; dated May 26, 2005

CAP036606; Control of Combustibles; dated May 27, 2005

CAP036610; Combustible Material located in Exclusion Zone; dated May 27, 2005

CAP036700; Smoke Removal Procedure Enhancement for AOP913 “Fire”; dated June 6, 2005

CAP036710; Protopower’s engineering evaluation 04-E09; dated June 7, 2005

CAP036713; Combustible Material Storage; dated June 7, 2005

CAP036810; Ineffective corrective actions from CAP 25653; dated June 16, 2005

CAP036811; Untimely corrective Actions Associated with Fire Impairments; dated June 16, 2005

Correspondence:
NG-03-0579; Generic Letter 2003-01: Control Room Habitability 60-Day Response; dated August 11, 2003

NG-05-0049; Generic Letter 2003-01: Control Room Habitability - Design Bases, Licensing Bases and Inleakage Testing Results; dated January 28, 2005

Nuclear Oversight 1st Quarter 2004 Assessment Report for Duane Arnold - Assessment Number 2004-001-1; dated July 26, 2004

Nuclear Oversight 2nd Quarter 2004 Assessment Report for Duane Arnold - Assessment Number 2004-002-1; dated August 11, 2004

NG-04-0662; Nuclear Oversight 3rd Quarter 2004 Assessment Report for Duane Arnold - Assessment Number 2004-003-1; dated October 19, 2004

NG-05-0048; Nuclear Oversight 4th Quarter 2004 Assessment Report for Duane Arnold - Assessment Number 2004-004-1; dated January 21, 2005

NG-05-0313; Nuclear Oversight 1st Quarter 2005 Assessment Report for Duane Arnold - Assessment Number 2005-001-1; dated May 31, 2005

Duane Arnold Energy Center CAP Self-Assessment Report - March 17-21, 2003; dated April 23, 2003

White Paper on Expectations for Procedure Use in the Operations Department; dated March 10, 2003

Engineering Evaluations
Operability Evaluation for ‘A’ and ‘B’ RHRSW Operability; dated August 5, 2002

Epoxy Coating Floors with Respect to the DAEC Fire Protection Program; dated July 25, 2003

Miscellaneous

OE17197; CRD HCU Scram Inlet Valve Air Operator Diaphragm Cover Cracking; dated November 3, 2003

OE17224; Perturbation of Indicated Reactor Level was Experienced when Reference Leg Isolation Valve Leaked Through During a Surveillance; dated November 6, 2003

OE17234; Crane Event at Plant Farley; dated November 6, 2003

OE17270; Unauthorized High Radiation Area Entry; dated November 13, 2003

OE17317; Increased Floor Drain Dose Rates during Noble Metals Injection; dated November 20, 2003

OE17403; Insensitivity to QA Vault Fire Alarms; dated December 4, 2003

OE17428; Loss of Feedwater and Reactor Scram; dated December 10, 2003

OE17445; Preliminary Notification - Fuel Storage Cask Surveys Not Performed IAW Revised Technical Specification; dated December 12, 2003

OE001314; External OE - Pilgrim Emergency Sirens Inop/Degraded Due to Potential Amplifier Problems; dated January 22, 2004

OE001373; External OE - OE17408, Safety-Related Reactor Building Cooling Fan Blade Failure at Oconee; dated January 30, 2004

OE001351; OE17758 - Prompt Alert Siren System Experienced Repeat Battery Charger Failures at Perry Plant; dated February 18, 2004

OE17835; Failure of Operations to Consistently Implement Procedures, Standards and Expectations; dated February 23, 2004

OE001373; External OE - Evaluate Issue Concerning Potassium Iodide at Kewaunee; dated March 22, 2004

OE001375; External OE - OE17824, Follow-up to OE 16925 - Post-Scram Recovery Actions with High DW Press.; dated March 22, 2004

OE001409; External OE - OE18064, Unplanned Loss of RCIC Occurred when Under Voltage Relay Failed at Columbia Generating; dated April 23, 2004

OE001425; External OE - OE18194, Near Miss due to Quick Disconnect Failure at Perry; dated May 18, 2004

OE001430; External OE - OE18199, Bussman Fuse Failures at Pilgrim; dated May 21, 2004

OE001508; External OE - OE18603, Degraded Emergency Diesel Exhaust Supports at North Anna; dated July 2, 2004

OE001883; External OE - OE18982, Improperly Sized Orifices Result in HPCI Inoperability; dated September 9, 2004

OE001373; External OE - Evaluate OE from Prairie Island Described in PI CAP040152; dated February 8, 2005

OE005097; External OE - OE20041, Unexpected Decrease in RPV Level (Update to OE16171); dated March 18, 2005

Operations Department Yellow Sheet for CAP035443; dated March 28, 2005

PWR 28519; OI 149, RHR Procedure Change Request; dated March 29,2005

Procedures

ACP 101.01; Procedure Use and Adherence; Revision 29

ACP 114.3; Root Cause and Apparent Cause Analysis; Revision 15

ACP 114.4; Corrective Action Program; Revision 12

ACP 114.4; Corrective Action Program; Revision 19

ACP 114.5; Action Request System; Revision 46

ACP 114.8; Action Request Trending; Revision 5

ACP 1410.1; Operations Working Standards; Revision 45

ACP 1412.2; Control of Combustibles; Revision 24

AFP-24; Control Building 1-A4, 1A-3, Essential Switchgear Rooms; Revision 28

AOP 913; Fire; Revision 33

AOP 913; Fire; Revision 35

AOP 913; Fire; Revision 40

FORM NG-169Z; Heat Exchanger Bio/Silt Fouling Inspection Form; Revision 1

FP-OP-COO-01; Conduct of Operations; Revision 1

FP-PA-ARP-01; Action Request Process; Revision 7

GENERA-F010-01; Fairbanks-Morse, Standby Diesel Generator 38TD8-1/8; Revision 35

GMP-MECH-26; Heat Exchangers; Revision 7

NMC Apparent Cause Evaluation Manual, Revision 2

NMC Common Cause Evaluation Manual; Revision 0

NMC CAP trend Code Manual; Revision 3

NMC Fleet Procedure FP-PA-ARP-01; Action Request Process; Revision 7

OI 149; Residual Heat Removal System; Revision 91

NRC Inspection Reports

IR 0500331/2003002(DRS)

IR 0500331/2003003(DRP)

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