

January 19, 2006

Mr. Christopher M. Crane
President and CNO
Exelon Nuclear
Exelon Generation Company, LLC
200 Exelon Way KSA 3-E
Kennett Square, PA 19348

SUBJECT: PEACH BOTTOM ATOMIC POWER STATION UNIT 2- SUPPLEMENTAL
INSPECTION REPORT 05000277/2005008

Dear Mr. Crane:

On December 7, 2005, the NRC completed a supplemental inspection at the Peach Bottom Atomic Power Station. The enclosed report documents the results of the inspection, which were discussed with Mr. B. Braun and other members of your staff on December 7, 2005.

The NRC performed this supplemental inspection to assess your activities to address the Peach Bottom Unit 2 Scrams With Loss of Normal Heat Removal performance indicator (PI) crossing the Green-White threshold in the fourth quarter of 2004. The purpose of this inspection was to assure that the causes of the performance issues associated with this PI crossing the Green-White threshold were understood, the extent-of-condition and cause were identified, and that corrective actions were sufficient. Inspection Procedure 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," was used as guidance for the inspection.

Based upon the results of this inspection, the NRC determined that the problem identification, root and contributing cause evaluation, extent of condition and cause assessment, and corrective actions for the White performance indicator were adequate. No findings of significance were identified. Therefore, consistent with NRC Inspection Manual Chapter 0305, Operating Reactor Assessment Program, the performance indicator will only be considered in assessing plant performance until it crosses below the threshold, returning it to a Green characterization.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be available electronically for public inspection in the NRC Public Document

Mr. Christopher M. Crane

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Sincerely,

/RA/

Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

Docket No. 50-277
License No. NPF-44

Enclosure: NRC Inspection Report No. 05000277/20050
w/Attachment: Supplemental Information

cc w/encl:

Site Vice President, Peach Bottom Atomic Power Station
Plant Manager, Peach Bottom Atomic Power Station
Regulatory Assurance Manager - Peach Bottom
Associate General Counsel, Exelon Generation Company
Manager, Financial Control & Co-Owner Affairs
Manager Licensing, PBAPS
Director, Nuclear Training
Correspondence Control Desk
Director, Bureau of Radiation Protection (PA)
R. McLean, Power Plant and Environmental Review Division (MD)
R. Fletcher, Maryland Department of Environment
T. Snyder, Director, Air and Radiation Management Administration,
Maryland Department of the Environment (SLO, MD)
Public Service Commission of Maryland, Engineering Division
Board of Supervisors, Peach Bottom Township
B. Ruth, Council Administrator of Harford County Council
Mr. & Mrs. Dennis Hiebert, Peach Bottom Alliance
TMI - Alert (TMIA)
J. Johnsrud, National Energy Committee, Sierra Club
Mr. & Mrs. Kip Adams
Vice-President, Licensing and Regulatory Affairs
Vice-President, Operations Mid-Atlantic
Senior Vice-President, Nuclear Services
Director, Licensing and Regulatory Affairs
J. Fewell, Assistant General Counsel

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket No. 50-277

License No. NPF-44

Report No. 05000277/2005008

Facility: Peach Bottom Atomic Power Station Unit 2

Location: 1848 Lay Road
Delta, Pennsylvania

Dates: December 5, 2005 through December 7, 2005

Inspectors: S. Pindale, Senior Reactor Inspector
J. Josey, Reactor Inspector

Approved by: Lawrence T. Doerflein, Chief
Engineering Branch 2
Division of Reactor Safety

SUMMARY OF FINDINGS

IR 05000277/2005008; 12/05/2005 to 12/07/2005; Peach Bottom Atomic Power Station Unit 2; Supplemental Inspection of Scrams With Loss of Normal Heat Removal Performance Indicator.

This inspection was conducted by two regional inspectors. No findings of significance were identified. 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.

Cornerstone: Initiating Events

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection to assess Exelon's evaluation in response to a White performance indicator (PI) in the initiating events cornerstone. Peach Bottom Unit 2 crossed the threshold from Green to White for Scrams With Loss of Normal Heat Removal in the fourth quarter of calendar year 2004. This supplemental inspection assessed Exelon's problem identification, cause evaluation and corrective actions associated with the Unit 2 Scrams With Loss of Normal Heat Removal PI. Based on the results of this inspection, no findings of significance were identified.

Overall, the inspectors concluded that Exelon adequately addressed the problem identification and problem resolution attributes of NRC inspection procedure 95001. The inspectors did not identify any common root causes for the three scrams. Minor weaknesses were noted associated with root cause characterization, and the timeliness and adequacy of documenting potentially similar problems in the corrective action program. None of these weaknesses adversely impacted Exelon's conclusions or corrective actions. Some examples of these problems were similarly identified and discussed in Exelon's focused area self assessment, which was completed several weeks prior to the NRC's supplemental inspection.

Therefore, consistent with the guidance in NRC Inspection Manual Chapter (IMC) 0305, Operating Reactor Assessment Program, the performance indicator associated with Loss of Normal Heat Removal will only be considered in assessing plant performance until it crosses below the threshold, returning it to a Green characterization.

REPORT DETAILS

01 INSPECTION SCOPE (IP 95001)

The U.S. Nuclear Regulatory Commission (NRC) performed this supplemental inspection in accordance with NRC Inspection Procedure (IP) 95001, "Inspection For One or Two White Inputs in a Strategic Performance Area," to assess Exelon's problem identification, cause evaluation and corrective actions associated with the Peach Bottom Unit 2 Unplanned Scrams with Loss of Normal Heat Removal Performance Indicator (PI). This performance indicator was characterized as White in the fourth quarter 2004. A total of three scrams with loss of normal heat removal caused the performance indicator to cross the Green - White threshold on this occasion. A summary of the three scram events, including the licensee identified root or apparent cause, and corrective actions to prevent recurrence, are listed below:

- On December 21, 2002, an electro-hydraulic control (EHC) system circuit card failure resulted in a closure of main steam isolation valves (MSIV) and a scram. Exelon concluded that the circuit card failure was caused by a manufacturing defect in a component on the circuit card. The circuit card had been installed three months earlier. The corrective actions included ensuring there were no similar defective components installed on circuit cards at Peach Bottom.
- On July 22, 2003, a main generator lockout and scram occurred as a result of a ground fault caused by a piece of broken fan belt in the isophase bus duct cooling system. Exelon concluded that a design weakness existed in that there were no debris guards to prevent intrusion of fan belt material into the fan suction. The corrective actions included installing debris guards.
- On December 22, 2004, an EHC system circuit card failure resulted in a closure of MSIVs and a scram. Exelon concluded that the circuit card failure was caused by a manufacturing defect associated with a particle of solder that was deposited across two of the traces on the card. The circuit card had been installed three months earlier. The corrective actions included inspecting all circuit cards prior to installation for the existence of similar solder deposits on the circuit traces.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

- a. Determination of who identified the issue and under what conditions

The White Unplanned Scrams With Loss of Normal Heat Removal PI was self revealing through Exelon's collection of PI data taken in support of the NRC's reactor oversight program. Each of the three reactor scrams with loss of normal heat removal that caused the PI to cross the Green-White threshold were also self-revealing.

- b. Determination of how long the issue existed, and prior opportunities for identification

The inspectors concluded that the prior opportunities for identification were appropriately assessed in the root cause evaluations, as applicable. For example, Exelon concluded that the root cause evaluation for the December 21, 2002, EHC card failure provided details regarding opportunities to have learned from prior similar circuit card failures in EHC.

- c. Determination of the plant-specific risk consequences and compliance concerns

The risk significance was addressed as part of the investigations associated with each of the three events. The licensee determined that the events were of very low risk significance. The inspectors agreed with this determination based on a review of the individual events. The NRC performed a special inspection for the EHC circuit card failure in December 2002; the results of this inspection are documented in NRC Inspection Report 05000277/2003007.

The inspectors concluded that Exelon adequately addressed the problem identification attributes of inspection procedure 95001.

02.02 Root Cause and Extent of Condition Evaluation

- a. Evaluation of methods used to identify root causes and contributing causes

Exelon used a combination of event and causal factor, barrier analysis, cause and affect analysis, and complex trouble shooting techniques to evaluate the issues. The inspectors found the evaluation methods to be acceptable.

Noting that the NRC had previously performed a supplemental inspection for unplanned scrams and reviewed two of the three events (NRC Inspection Report 05000277/2004011), Exelon performed a pre-inspection assessment of the individual and aggregate actions taken to address the December 2004 event, and a review of the corrective actions for the December 2002 and July 2003 events. The inspectors determined that the deficiencies identified in the assessment were adequately addressed.

The inspectors did not identify a common cause for the three scrams. However, the inspectors identified a minor weakness related to the effectiveness of evaluating potentially similar issues in Exelon's corrective action program. Examples of this problem were identified and discussed in the Exelon's self assessment.

Exelon did not perform a separate common cause analysis in response to the White PI, although key elements of a common cause analysis were contained in the December 2004 event evaluation. Since there was no common cause analysis, the inspectors independently evaluated the cause analysis for each of the three scrams.

b. Level of detail of the root cause evaluation

Overall, the inspectors found the level of detail of the root cause evaluations was acceptable. However, there was one observation associated with Exelon's root cause characterization, as described below.

Based upon interviews and data reviewed, the inspectors observed that some root cause conclusions appeared to be driven by the corrective action process rather than the root cause evaluation. Specifically, some licensee staff indicated that in order for a cause to be called the root cause, there had to be an adverse condition that was licensee-correctable with an associated corrective action to prevent recurrence (CAPR) assigned. Procedurally, this is not a requirement as some adverse conditions, such as an undetectable manufacturing defect, is not licensee-correctable. This misconception led to some of the root causes for the events being incorrectly labeled as contributing causes. For instance, the December 2002 event was determined to be due to a faulty subcomponent on a circuit card, specifically an operating amplifier, but Exelon determined that the root cause was the EHC system design was not fault tolerant. The associated CAPR for this root cause was an assignment to replace the EHC system with a digital, fault tolerant system. Subsequently, the station reevaluated the root cause for this event and determined that the previously identified root cause was too broad and could not be corrected in a timely manner. Exelon appropriately recharacterized the root cause to be the manufacturing defect, although there was not a specific CAPR associated with it.

The inspectors characterized this as a weakness in that an incorrect root cause determination can potentially lead to ineffective corrective actions. Nonetheless, in the evaluations reviewed, the inspectors found that the actual root causes and contributing causes were associated with appropriate corrective actions.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

Overall, the root cause reports associated with the individual events considered prior occurrences and similar problems where applicable. The inspectors did not identify any additional examples in which prior occurrences of the problem or prior operating experience was not considered.

d. Consideration of potential common causes and extent of condition of the problem

Overall, the inspectors determined that the extent of condition and cause reviews were adequate. However, in some instances, the inspectors identified minor weaknesses where the reviews were not effectively focused. One example includes the following:

One aspect of the extent of cause review for the December 2002 EHC circuit card failure was weak regarding the contributing cause of not generating condition reports for previous similar operating amplifier failures. The Exelon investigation found that condition reports were not written because (1) Exelon staff was not aware of the

procedure requirement to do so, and (2) for not applying engineering fundamentals. These errors were attributed to poor change management in that maintenance personnel were not aware of the rework procedure requirements. The Exelon staff at Peach Bottom missed the opportunity to develop broader corrective actions for change management problems until prompted by assessments of several external groups, including Exelon Nuclear Oversight and the corporate Nuclear Safety Review Board, about a year later.

Overall, regarding the root cause and extent of condition evaluations, the inspectors concluded that Exelon adequately determined and corrected the root causes of the events. Exelon addressed the inspectors' observation related to the adequacy of correctly labeling the root and contributing causes by initiating Condition Report 430987 in their corrective action program.

02.03 Corrective Actions

a. Appropriateness of corrective actions

Exelon implemented appropriate and timely corrective actions to repair the equipment deficiencies associated with each of the reactor scrams. They also instituted adequate barriers or other corrective actions to address the issues that were related to other than equipment problems (e.g., process and procedure changes).

b. Prioritization of corrective actions

The proposed corrective actions were prioritized commensurate with safety significance. The inspectors identified minor weaknesses related to corrective action timeliness, and one example is described below:

Corrective actions for one of the contributing causes associated with the broken isophase bus duct cooling fan belt (July 2003 scram) were not timely. Specifically, the installation of matched belt sets on all isophase cooling fans, which will minimize belt failures, was not completed on Unit 3 until September 2004, more than a year after the event.

c. Establishment of a schedule for implementing and completing the corrective actions

The inspectors determined Exelon's schedule for implementing and completing corrective actions was adequate.

d. Establishment of quantitative or qualitative measures of success for determining the effectiveness of the corrective actions to prevent recurrence

The corrective action plans for the three events included effectiveness reviews; however, most of these reviews were not completed prior to the end of this inspection.

The inspectors concluded that sufficient actions have been taken to reasonably prevent recurrence of similar events. This conclusion is also supported by the fact that there were no additional scrams as of the conclusion of this inspection.

03 MANAGEMENT MEETINGS

03.01 Exit Meeting Summary

The results of this inspection were discussed with Mr. B. Braun, Site Vice President, and other members of Exelon management and staff at the conclusion of this inspection on December 7, 2005. No proprietary information was received as part of this inspection.

03.02 Regulatory Performance Meeting

In accordance with the requirements of Manual Chapter 0305, the exit meeting also served as a Regulatory Performance meeting, with Mr. Richard J. Conte, Operations Branch Chief, NRC Region I, meeting with Mr. B. Braun and other members of the licensee staff.

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Exelon Generation Company

D. Henry, Manager, Business Support
B. Woodard, System Engineer
D. Foss, Regulatory Assurance
C. Behrend, Senior Manager, Engineering
J. Mallon, Manager, Regulatory Assurance

DOCUMENTS REVIEWED

Corrective Action Documents

CR 430987, CR 248779
Root Cause Report for CR 137110, "Failed EHC Card Caused Unit 2 Reactor Scram and primary containment isolation system Group I Isolation" (12/21/02 event)
Root Cause Report for CR 168589, "Unit 2 Scram Due to Generator Lock Out (Isophase Bus Cooler Belt foreign material exclusion)" (7/22/03 event)
Root Cause Report for CR 336743, "Primary Containment Isolation System Group I Isolation Due to High Main Steam Line Area Temperature" (7/22/03 event)
Root Cause Report for CR 285024, "Reactor Scram due to malfunction of an Electro Hydraulic Control System Pressure Setpoint Card," (12/22/04 event)

Procedures and Other Documents

LS-AA-125, Corrective Action Program Procedure, Rev. 9
LS-AA-125-1001, Root Cause Analysis, Rev. 5
Focused Area Self Assessment 336743
Action Requests A198392, A198386

LIST OF ACRONYMS

CAPR	Corrective Action to Prevent Recurrence
CR	Condition Report
EHC	Electro-Hydraulic Control
IP	Inspection Procedure
MSIV	Main Steam Isolation Valve
NRC	Nuclear Regulatory Commission
PI	Performance Indicator