

December 22, 1999

Mr. Charles H. Cruse  
Vice President - Nuclear Energy  
Baltimore Gas and Electric Company (BGE)  
Calvert Cliffs Nuclear Power Plant  
1650 Calvert Cliffs Parkway  
Lusby, MD 20657-4702

**SUBJECT: NRC REGION 1 INTEGRATED INSPECTION REPORT NOS. 05000317/99009  
AND 05000318/99009**

Dear Mr. Cruse:

This report transmits the findings of the safety inspection conducted by NRC inspectors at the Calvert Cliffs Nuclear Power Plant from October 3, 1999 to November 20, 1999. At the conclusion of the inspection, these findings were discussed with Mr. Katz and others of your staff.

Overall, the NRC has concluded that your facility was operated in a safe manner. Your conduct of activities was generally characterized by safety-conscious operations, appropriate engineering and maintenance activities, and careful radiological controls. Your staff effectively planned, scheduled, and repaired a leaking Unit 1 main transformer bushing. This effort required significant reactor plant power changes and coordination of engineering and maintenance activities with plant operations. The repairs were completed safely.

We appreciate your cooperation. In accordance with 10 CFR 2.790 of the NRC "Rules of Practice", a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Sincerely,

**Original Signed by William Cook for:**

Michele G. Evans, Chief  
Projects Branch 1  
Division of Reactor Projects

Docket/License Nos.: 05000317/DPR-53  
05000318/DPR-69

Enclosure: NRC Region 1 Integrated Inspection Report Nos. 05000317/99009  
and 05000318/99009

cc w/encl:

Charles H. Cruse

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**U.S. NUCLEAR REGULATORY COMMISSION  
Region 1**

License Nos.: DPR-53; DPR-69

Docket Nos.: 05000317; 05000318

Report Nos.: 05000317/99009; 05000318/99009

Licensee  
Baltimore Gas and Electric Company  
Post Office Box 1475  
Baltimore, Maryland 21203

Facility: Calvert Cliffs Nuclear Power Plant  
Units 1 and 2

Location: Lusby, MD

Dates: October 3, 1999 to November 20, 1999

Inspectors: Scott Stewart, Senior Resident Inspector  
Fred Bower, Resident Inspector  
Tim Hoeg, Resident Inspector  
Larry Briggs, Senior Reactor Engineer  
Joe D'Antonio, Reactor Engineer  
Leonard S. Cheung, Senior Reactor Inspector

Approved By: Michele G. Evans, Chief  
Projects Branch 1  
Division of Reactor Projects

**Executive Summary**  
**Calvert Cliffs Nuclear Power Plant, Units 1 and 2**  
**Inspection Report Nos. 05000317/99009 and 05000318/99009**

This integrated inspection report summarizes aspects of BGE operations, maintenance, engineering, and plant support. The report covers a seven week period of resident inspection and the results of a specialist inspection of licensed operator requalification training and a specialist inspection of electrical breakers.

**Plant Operations**

BGE operations effectively supported maintenance on the U25000-11 main transformer by changing reactor power levels and setting plant conditions in a timely manner. (O1.1)

The performance of the non-licensed plant operators during rounds was thorough with the appropriate focus on safety, equipment status, and observation of plant conditions. Communications between plant operators and the control room was formal and complete. (O1.2)

The Licensed Operator Requalification Training program met regulatory requirements with no significant weaknesses identified. Selected industry events which were applicable to Calvert Cliffs operators were properly incorporated into the training. The evaluations of the simulator scenarios and job performance measures by the training staff were objective and thorough. The feedback process as part of the systems approach to training program was found to be effective. (O1.3)

**Maintenance**

During maintenance activities, the inspectors observed that technicians were experienced and knowledgeable of their assigned maintenance responsibilities. The observed maintenance personnel practiced self checking and peer checking techniques in performance of their activities. Spent fuel pool underwater maintenance by contracted diving specialists was properly controlled and managed by BGE. (M1.1)

Surveillance testing was thorough and demonstrated system and component operability. The inspectors observed that minor discrepancies noted during the tests were properly entered into the BGE corrective action system. BGE maintenance and engineering personnel responded appropriately to a problem with the 2A emergency diesel, providing prompt corrective actions for a crankcase pressure indication deficiency. (M1.2)

Surveillance testing was thorough and demonstrated system and component operability. The inspectors observed that minor discrepancies noted during the tests were properly entered into the BGE corrective action system. BGE maintenance and engineering personnel responded appropriately to a problem with the 2A emergency diesel providing prompt corrective actions for a crankcase pressure indication deficiency. (M1.3)

## Executive Summary (cont'd)

### **Engineering**

BGE appropriately evaluated degraded and non-conforming conditions impacting plant safety systems. However, implementation of the administrative requirements of procedure NO-1-106, "Functional Evaluation/Operability Determination" was poor. For example, several corrective actions associated with active operability determinations have slipped their due dates and, in some instances, not been sufficiently justified. In addition, the Shift Manager's Operability Determination Book was not maintained up-to-date, active operability determinations (ODs) were not periodically updated to reflect new information, and quarterly OD reviews per NO-1-106 were cursory. These inspector findings reflect poor Operations and Engineering department management oversight of this process. (E1.1)

Breaker modifications, inspections and post-modification testing for correcting a 10 CFR Part 21 manufacturing defect were accomplished in accordance with the work instructions and the activities were appropriately documented. The breaker procurement design specification was well prepared and of good quality, containing appropriate design data for the breakers. The Vendor Assessment Unit provided adequate involvement in overseeing the breaker procurement activities. (E2.1)

### **Plant Support**

BGE personnel performed a well organized and comprehensive pre-evolution brief prior to spent fuel pool diving maintenance activities. The brief was attended by dive personnel, radiological controls, maintenance, and management personnel. Good interaction between participants was noted. (R1.1)

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**ATTACHMENTS**

- Attachment 1: Partial List of Persons Contacted
- Inspection Procedures Used
- Items Opened, Closed and Discussed
- List of Acronyms Used

## Report Details

### Summary of Plant Status

Units 1 operated at or near 100 percent reactor power throughout the entire inspection period with the following exceptions: Unit 1 reduced power to six percent on October 15, to investigate an oil leak on the unit main transformer, and returned to full power on October 17. On October 21, Unit 1 reduced power to approximately 6 percent, to repair the oil leak on the transformer, and returned to full power on October 22, 1999.

Unit 2 operated at full power throughout this inspection period.

## I. Operations

### **O1 Conduct of Operations**

#### O1.1 General Comments (71707)

Plant operations were performed event free with a focus on nuclear safety. The inspectors conducted daily tours of the control room to observe the operators performing various activities. The inspectors verified plant parameters and system alignments met the requirements for the current mode of operation. The plant operators were attentive and aware of current plant conditions, technical specification limiting conditions of operations (LCO), and risk significant work in progress. Control room shift turnovers were performed in a thorough manner with clear communications noted by the inspectors. Operations participation in surveillance testing was effective. Operators had the lead role for performing the pre-test briefings and coordinating the entering and exiting of LCO's during the testing.

On October 15 and 21, 1999, operations personnel effectively supported troubleshooting and maintenance on the U25000-11 unit main transformer. Plant power was lowered and the unit 1 main generator was taken off-line to repair a leaking main transformer bushing. The plant operators controlled reactivity and plant equipment in accordance with written procedures. The planned power changes were coordinated with the engineering and maintenance departments, who provided operations support and completed the repairs. The repairs were completed without complications.

#### O1.2 Observation of Non-Licensed Nuclear Plant Operators

##### a. Inspection Scope (71707)

During back shift hours, the inspectors observed and assessed non-licensed nuclear plant operators participating in shift turnovers and performing tours of their assigned areas of the plant.

##### b. Observations and Findings

During back shift hours on November 8 and 10, 1999, the inspectors observed non-licensed nuclear plant operators (NPOs) performing tours and walkdowns of the Unit 2 Auxiliary Building and Unit 1 Turbine Building respectively. The walkdowns included



taking of logs for various operating temperatures and pressures, checks for cleanliness and housekeeping, and verification of system lineups. The inspectors verified the NPOs attended the shift turnovers where equipment operating status, major work in progress, and plant issues were discussed. The operators were attentive and demonstrated an understanding of equipment and plant status.

During the building tours, the inspectors observed that the NPO personnel wore the required safety equipment and dosimetry. The operators observed radiation requirements and other signs and postings during entry and exit from the various rooms in the radiologically controlled area. Communications between the operators and the control room were formal and complete. The NPOs verified plant parameters were in compliance with the various specifications. The NPOs were observed checking that the associated equipment was in the proper lineup and functioning satisfactorily. All assigned areas were visited during the tours and various plant parameters were recorded in the log keeping system. Local pressure and temperature monitoring equipment was verified to be functioning and reading within specifications. The inspector observed that the NPOs performed thorough inspections for abnormal conditions. No abnormalities or out of specification readings were noted by the inspectors.

c. Conclusions

The performance of the non-licensed plant operators during rounds was thorough with the appropriate focus on safety, equipment status, and observation of plant conditions. Communications between plant operators and the control room was formal and complete.

O1.3 Licensed Operator Requalification Training Program Evaluation

a. Inspection Scope (71001)

The Calvert Cliffs licensed operator requalification training (LORT) program was evaluated during the week of October 25, 1999. The following areas were included in the evaluation: facility operating history; LORT program content; written and operating test content; operating test administration; training feedback program; remedial training; and, conformance with license medical and training requirements.

b. Observations and Findings

Facility Operating History

The inspectors reviewed the licensee event reports (LERs) for the years of 1998 and 1999. There were no LERs initiated as a result of licensed operator errors. Discussion with the NRC resident staff provided additional confirmation of a good operating history during the last two years.

LORT Program Content

The inspectors reviewed the subjects covered in the 1998 -1999 LORT cycles, including a sample of training on modifications and industry events. BGE was effectively incorporating appropriate topics in their LORT program. Operator interviews indicated that the operators were getting the training required for them to do their jobs.

#### Written and Operating Test Content and Administration

The inspectors reviewed the operator written requalification exam for weeks 0, 1, and 2 of the current exam cycle. Week 0 was the exam administered to the licensed instructor staff. BGE administered both an open reference and a static simulator section of the written examination. Both sections met the examination standards, were of very good quality, and were appropriately difficult.

One inspector concern was noted in the examination overlap between weeks 0 and 1. The facility considered the exam for the licensed instructor staff to be a validation of the examination, and administered the identical exam to the first operating and staff crew in week 1. Subsequent exams were 75% different. The 100% overlap between the first two exams did not meet the NRC examination standard expectation that overlap will not be so high as to give cause to question examination discrimination validity and integrity. BGE stated that they understood the concern and would no longer treat the instructor staff exams differently than the operating crew examinations. An Issue Report (IR3-008-807) was written to place this item into the corrective action process for formal resolution.

The inspectors reviewed the grades of the instructor staff, the operating crew, and the staff crew, for the written and static portions of the 1997 and 1999 year tests. The grades did not indicate any compromise of the written and static examinations. The 1999 grades were overall lower than the 1997 grades with two overall failures and one static only failure during the 1999 test and no failures during the 1997 test for the same individuals. In addition, all personnel signed a security agreement that all work was their own and that they would not divulge any information concerning the examination. The review by the inspectors did not reveal any evidence of compromise, per 10 CFR Part 55.49.

The inspectors reviewed five simulator scenarios prepared to be administered during the inspection. The scenarios and sets met the criteria of the examination standards. However, one set contained two steam generator tube ruptures where the major event differed only in that the second scenario ended with a transition to emergency operating procedure EOP-8, with no further operator action required. The inspector was concerned that there was not sufficient difference between the scenarios. BGE altered the remaining scenario sets to be administered. The inspectors also observed eight dynamic simulator scenario examinations during the week. Three of the five scenarios used to test the operating crew were repeated for the staff crew.

The inspectors reviewed the 29 job performance measures (JPMs) to be administered during the inspection week and observed exam administration for three individuals. The JPM sets met the criteria of the examination standards and no discrepancies were noted during administration.

### Training Feedback and Remedial Training

The BGE training feedback process was found to be effective in capturing operator concerns and providing timely resolution. This conclusion was based upon operator interviews and a review of training records associated with feedback, such as BGE Reaction Forms, Session Reports, and End of Session Reports. Feedback effectiveness was verified by review of program changes such as splitting the operating crew from the staff crew during written and static exams to minimize the demand for reference material during examination administration.

The inspectors also reviewed remedial training prescribed for personnel that received less than passing grades on session quizzes. The remedial training plans were developed to meet each individual's identified weaknesses by the training staff with input and approval from operations.

### Risk Insights

The inspectors reviewed the use of the Calvert Cliffs probabilistic risk assessment (PRA) in developing exam and training materials. The facility had verified that significant human errors identified in the PRA were covered by training tasks but had not evaluated high core damage frequency (CDF) event paths for training use. In discussion with the inspectors, the requalification program supervisor stated the facility was considering this upgrade.

### Compliance with License Conditions

A review of records and discussions with licensee personnel found that BGE was meeting the requirements of: 10 CFR Part 55.21 for medical examinations of operators, and 10 CFR Part 55.59 for operator participation in the LORT program. One attendance issue was identified where four operators had attended a classroom session on severe accident mitigation guidelines, but had missed a tabletop scenario session using these guidelines and had not made up the missed session. The BGE program allowed for missed simulator training which cannot be made up, to be addressed by an evaluation that appropriate tasks had been covered in other training. BGE stated that such a review had been done for these operators for the tabletop training, but had not been documented due to an administrative oversight. The inspectors reviewed the basis documents addressing the rationale behind the training and concurred in the assessment that these operators were adequately trained by the classroom session. The supervisor of requalification training noted that the justification would be documented and placed in the training files.

c. Conclusions

The Licensed Operator Requalification Training program met regulatory requirements with no significant weaknesses identified. Selected industry events which were applicable to Calvert Cliffs operators were properly incorporated into the training. The evaluations of the simulator scenarios and job performance measures by the training staff were objective and thorough. The feedback process, as part of the systems approach to training program, was found to be effective.

## II. Maintenance

### **M1 Conduct of Maintenance**

#### M1.1 General Comments

a. Inspection Scope (62707)

The inspectors reviewed maintenance activities and focused on the status of work that involved systems and components important to safety. Component failures or system problems that affected systems included in the BGE maintenance rule program were assessed to determine if the maintenance was effective. Also, the inspectors directly observed all or portions of the following work activities:

MO2199900791	Inspect 21 ECCS Pump Room Air Cooler Channel Head
MO2199900795	Clean 21 ECCS Pump Room Air Cooler Duplex Strainer
MO2199900797	Replace Anodes for 21 ECCS Pump Room Air Cooler
MO2199901317	Clean Tubes on 21 Component Cooling Heat Exchanger
MO1199901171	Remove and Replace Hydraulic Cylinders on SFP Upender

b. Observations and Findings

During the observed maintenance activities, the inspectors found that technicians were experienced and knowledgeable of their assigned duties. Maintenance personnel practiced peer checking and self-verification while doing work. The pre-job briefings included the important aspects of each maintenance task and were effective in ensuring the work was conducted in accordance with BGE requirements. Planned activities were assessed for impact on plant risk and maintenance was coordinated to minimize safety system unavailability and risk impact. Supervisory oversight and involvement with the maintenance was appropriate.

During the week of November 1, 1999, underwater maintenance activities were observed in the spent fuel pool (SFP) to remove and replace hydraulic cylinders on the fuel assembly upender machine (MO 1199901171). The actual underwater hands-on work was performed by contracted diving specialists. BGE maintenance supervisors were observed monitoring and directing the maintenance activity from the SFP floor using underwater cameras and communications. BGE maintenance personnel were observed providing the diver with clear and detailed maintenance steps before and during the evolution. The use of three-way repeat back communication between the

diver and the support team was noted by the inspector. The hydraulic cylinders were removed and replaced without complications.

c. Conclusions

During maintenance activities, the inspectors observed that technicians were experienced and knowledgeable of their assigned maintenance responsibilities. The observed maintenance personnel practiced self checking and peer checking techniques in performance of their activities. Spent fuel pool underwater maintenance by contracted diving specialists was properly controlled and managed by BGE.

M1.2 Routine Surveillance Observations

a. Inspection Scope (61726)

The inspectors observed all or portions of the following surveillance tests:

STP-M-212D-1	Unit 1 RPS Channel "D" Functional Test
STP-O-65N-1	11 Saltwater Header Valve Operability Test
STP-O-05A-1	Auxiliary Feedwater Operability Test
STP-O-08A-2	2A EDG Operability Test
STP-O-05A-2	Auxiliary Feedwater Operability Test

b. Observations and Findings

The inspectors found that surveillance activities were performed safely and in accordance with approved procedures. Test details were discussed at pre-test briefings, each followed by a question and answer session and attended by test participants. The test participants were knowledgeable of their assigned responsibilities. Supervisory and engineering personnel participation was clearly observed in the conduct of the surveillance tests. Minor test discrepancies were documented in the BGE corrective action program and properly resolved.

On November 15, 1999, during the 2A Emergency Diesel Generator (EDG) monthly surveillance test (STP-O-8A-2), the engine was stopped and the test aborted when the local crankcase pressure indication revealed an abnormal pressure. The engine was declared inoperable and the applicable technical specification action statement was entered. Troubleshooting was performed by BGE maintenance and engineering personnel and it was determined that the crankcase manometer line was partially blocked with oil. An issue report (IR3- 057-671) was written, the manometer line was unblocked, and the surveillance test performed satisfactorily. During the second test, the crankcase pressure was monitored using a test rig and was found to be normal. Engineering personnel determined that the engine would have completed its safety function, in spite of erroneous manometer indication. The crankcase pressure alarms and other protective features were not affected. BGE established an action tracking item to determine the root cause of the manometer line blocking.

c. Conclusions

Surveillance testing was thorough and demonstrated system and component operability. The inspectors observed that minor discrepancies noted during the tests were properly entered into the BGE corrective action system. BGE maintenance and engineering personnel responded appropriately to a problem with the 2A emergency diesel providing prompt corrective actions for a crankcase pressure indication deficiency.

### **III. Engineering**

#### **E1 Conduct of Engineering**

##### **E1.1 Review of Active Operability Determinations**

###### **a. Inspection Scope**

The inspectors reviewed a sampling of operability determinations (ODs) prepared by BGE to address degraded and non-conforming conditions impacting the operability of plant safety systems. The inspectors also reviewed BGE's adherence to administrative controls contained in Calvert Cliff's procedure NO-1-106, "Functional Evaluation/Operability Determination", and BGE's use of the guidance provided in NRC Generic Letter (GL) 91-18, "Information to Licensees Regarding the Resolution of Degraded and Nonconforming Conditions on Operability."

###### **b. Observations and Findings**

On October 20, the inspectors initiated a review of ODs following BGE's self-identification of a backlog of corrective actions associated with active ODs. Specifically, many of the individual OD action item due dates had passed without action taken by the BGE staff. In conjunction with the initial inspector follow-up, BGE management had commenced an examination of the adequacy of the OD action item tracking and resolution process. On October 22, issue report (IR) IR3-012-490 was written identifying that no clear administrative controls are specified in NO-1-106 to ensure that OD corrective actions are completed in a timely manner.

The inspectors conducted a follow-up of licensee progress on this issue on November 3, and included an examination of the Shift Manager's (SM's) Operability Determination Book. Based upon a sampling of active ODs, no immediate operability concerns or significant safety issues were identified. The inspectors concluded that the ODs reviewed were technically adequate to support the initial OD. However, the inspectors found administrative errors that included: (1) the operability determination status database in the SM's book did not reflect the status of the operability determinations filed in the SM's book; (2) outdated status database sheets were left in the SM's book; and, (3) instructions to access the current database were not maintained in the SM's book as required by NO-1-106. The inspectors also noted that per NO-1-106, Attachment 3, GS-NPO/Shift Manager Guidelines for Determination of Operability, if significant additional information is developed, the operability determination should be updated. Based on the sampling review of ODs, the inspectors noted examples where the ODs had not been updated to reflect the most recent information that either supported the original determination, changed the original operability basis, or provided

additional corrective actions for the initial OD. In addition, the inspectors reviewed completed quarterly reviews of the SM's Operability Determination Book, required by NO-1-106, Section 5.3. The inspectors noted that these reviews did not identify the problems found by the inspectors. Accordingly, it appeared that the quarterly reviews were not sufficient to ensure that the SM's Operability Determination Book and the associated status database were being maintained up-to-date.

The inspectors observed that, in addition to the missed due dates, some of the action items warranted explicit justification for deferral as recommended in GL 91-18. Examples identified by the inspectors included not updating the UFSAR, not submitting a license amendment request at the earliest opportunity, and deferral of OD final resolution beyond the next refueling outage. For these examples, BGE was unable to provide any explicit written justification. As a result, BGE initiated issue report IR3-012-491 to document the absence of an administrative process to review and explicitly justify deferral of corrective actions which had been originally established within a time frame commensurate with the safety significance of the affected structure, system, or component and GL 91-18 guidance.

The inspectors discussed IR3-012-490 with station management and learned that the responsible system engineers had been tasked to review and update operability determinations for their respective systems. The inspectors reviewed the General Supervisor of Plant Engineering's memo tasking the system engineers to review the active ODs and subsequently discussed the memo and its implementation with Engineering department management. BGE management acknowledged that efforts to resolve the OD process administrative issues were progressing slowly.

The above stated inspector findings were discussed and acknowledged by BGE management. At the conclusion of the inspection period, the NO-1-106 procedural adequacy and adherence concerns were still under review by BGE. An inspector follow-up item **(IFI 50-317&318/99-09-01)** will track BGE's activities to improve their administrative processes associated with operability determinations. This item will be examined by the inspectors in a subsequent inspection.

c. Conclusions

BGE appropriately evaluated degraded and non-conforming conditions impacting plant safety systems. However, implementation of the administrative requirements of procedure NO-1-106, "Functional Evaluation/Operability Determination" was poor. For example, several corrective actions associated with active operability determinations have slipped their due dates and, in some instances, not been sufficiently justified. In addition, the Shift Manager's Operability Determination Book was not maintained up-to-date, active operability determinations (ODs) were not periodically updated to reflect new information, and quarterly OD reviews per NO-1-106 were cursory. These inspector findings reflected poor Operations and Engineering department management oversight of this process.

**E2 Engineering Support of Facility and Equipment**

## E2.1 Engineering Procurement Activities

### a. Inspection Scope (IP 38707)

The inspector reviewed the licensee's procurement activities for 65 safety-related 4 kV vacuum circuit breakers supplied by Asea Brown Boveri (ABB) Combustion Engineering (ABBCE) in Windsor, Connecticut. These were retrofit breakers intended to replace the existing General Electric Magne-blast breakers, without replacing the existing breaker housing and wiring. The breakers were assembled as a commercial grade product by ABB Product Development Group (ABBPDG) in Cleveland, Ohio, using components (modules) manufactured by ABB Transmission and Distribution Company in Florence, South Carolina. Dedication of these breakers to safety-related application was performed by ABBCE at the ABBDG site. At the time of the inspection, 33 breakers were at the Calvert Cliffs site, and 32 breakers were at ABBDG.

### b. Observations and Findings

On June 25, ABBCE (the vendor) issued a 10 CFR Part 21 report (1999-33) to notify the NRC of a manufacturing defect on ABBCE supplied 4 kV vacuum breakers delivered to Calvert Cliffs. The defect was detected during pre-installation testing at the site. During the test, the breakers failed to close when close signals were applied to the breakers, resulting in a trip-free condition. The vendor initiated an extensive root cause analysis (RCA) effort. The RCA team consisted of three team members, one from ABBCE, one from ABBDG, and one from BGE. The results of the RCA were reviewed by the NRC during the November 1999 vendor inspection conducted by the Office of Nuclear Reactor Regulation (NRR) and was determined to be acceptable.

The licensee ordered the 65 breakers from the vendor in mid-1997. Thirty-seven breakers were delivered to Calvert Cliffs in late 1998, and three breakers were installed (after successful pre-installation testing) in early 1999, two for non-safety related application and one for a safety-related feeder breaker (normally closed, not affected by the trip-free condition) application. During the pre-installation testing of three additional breakers in early April 1999, the trip-free condition was observed on all three breakers. Subsequently, these breakers (plus one breaker that was damaged during shipment) were sent back to ABBDG.

The RCA concluded that certain linkages (the latch check switch extension bracket and the adjusting rod) of the breaker needed to be modified. The vendor prepared two work instructions, 55-00441-I, "Modification Work Instructions", and 55-00441-J, "Final Inspection and Test Instructions," to correct the breaker trip-free problem. The first instruction was for linkage replacement and the second instruction was for post-modification testing. These two instructions had been reviewed during the November 1999 vendor inspection conducted by NRR and were determined to have been adequate to correct the breaker trip-free problem.

During the week of November 15, the vendor performed the breaker modification on the 29 breakers in the Calvert Cliffs warehouse (three of the 33 breakers were installed and one was used for training purposes) using work instructions 55-00441-I and 55-00441-J. The inspector observed the linkage replacement for five breakers and the post-



modification inspection and testing for one breaker. These activities were accomplished in accordance with the work instructions. No abnormal conditions were observed. The inspector also reviewed the completed modification, inspection, and test reports, and found that the results of the activities were appropriately documented.

The inspector observed that there were no non-conformance tags on the 29 breakers (affected by 10 CFR Part 21 report) to be modified. The warehouse personnel explained that these breakers had been turned over to the Project Group, who used a "Class 3 Hold" at the computer to control the use of these breakers. The licensee stated that this practice was proceduralized, but was unable to provide the procedure (because of insufficient time at the conclusion the inspection) for the inspectors' review. An inspector follow-up item will track this observation to ensure that this licensee computerized "hold" practice is appropriately controlled by procedure and that it meets the requirements of 10 CFR 50, Appendix B **(IFI 50-317;318/99-09-02)**.

The inspector also reviewed the Design Specification for the 4 kV breakers, No. ES199600580, entitled "Replacement 4 kV Circuit Breakers" Revision 2, dated August 21, 1998, and found this document well structured and of good quality. This document contained appropriate design data for the breakers. Section 1.1 of Attachment C states that the seismic qualification requirements will provide acceptable methods to verify that the equipment being qualified can successfully meet its safety-related performance requirements before, during, and following one safe shutdown earthquake, preceded by five operating basis earthquakes. Section 3.0, item d of Appendix A, specifies the nominal control voltage to be 125 Vdc and the closing voltage to be 100-140 Vdc. In November 1997, the vendor elected two breakers to seismically qualify by type-testing, which was conducted at Wyle Laboratories in Huntsville, Alabama. The test results were documented in ABBCE Report 8067-ICE-37612, Revision 4, dated November 4, 1999. The test results indicated that the breaker was functionally tested to ensure breaker closure at nominal, high, and low control voltages before and after the seismic testing. However, the breaker was functionally tested only at the nominal control voltage (125 Vdc).

The licensee's review of their dc voltage calculations indicated that the dc control voltage at the breakers could drop to between 100 and 105 Vdc, immediately after a loss of offsite power (the most probable time when the emergency diesel generator output breakers would need to close). The inspector was concerned that the breakers had not been seismically tested at the low end of the postulated control voltage spectrum. The inspector noted that there was no analysis to show that the tested conditions satisfied the design requirements. However, during the exit meeting the licensee provided the inspector a preliminary analysis completed by the vendor. This observation will be reviewed in a subsequent inspection to ensure that the licensee's breaker testing satisfies the range of breaker control voltage design requirements **(IFI 50-317;318/99-09-03)**.

The inspector interviewed licensee Quality Assurance personnel and found that the Vendor Assessment Unit provided adequate involvement in overseeing the breaker procurement activities. One licensee individual participated the seven-week root cause analysis team (as a team member) for the breaker trip-free problem. Another assessor

was sent to ABBPDG during the week of November 15, 1999, to witness the post-modification testing of the breakers at ABBPDG. The inspector also observed an assessor monitoring the vendor's modification and post-modification testing activities.

c. Conclusion

Breaker modifications, inspections and post-modification testing for correcting a 10 CFR Part 21 manufacturing defect were accomplished in accordance with the work instructions and the activities were appropriately documented. The breaker procurement design specification was well prepared and of good quality, containing appropriate design data for the breakers. The Vendor Assessment Unit provided adequate involvement in overseeing the breaker procurement activities.

#### **IV. Plant Support**

### **R1 Radiological Protection and Chemistry (RP&C) Controls**

#### **R1.1 Spent Fuel Pool Diving Operations**

a. Inspection Scope (71750)

The inspector observed radiological control operations leading up to and including diving in the spent fuel pool to perform maintenance on fuel handling equipment. The inspector attended pre-job briefs and observed diving operations from the spent fuel pool observation area.

b. Observations and Findings

On November 1, the inspector observed an integrated pre-job diving brief conducted by BGE radiological controls and maintenance. The briefing was attended by all the dive team members including contracted commercial divers, maintenance, engineering, safety, and management oversight personnel. The dive team was introduced and a supervisor from radiological controls discussed the radiological requirements of BGE procedure RP-1-102, "Control of Radiation Protection Risk Significant Work." Topics discussed included industrial safety, individual responsibilities, communications, foreign material exclusion, lessons learned, and the required special work permit (SWP). SWP 99-113 Activity A, designated as a high risk evolution, was reviewed in detail by radiological controls supervision including radiological conditions, dose rate areas, protective clothing requirements, radiation safety technician coverage, dosimetry requirements, ALARA requirements, and stop work requirements. The inspector observed good interaction among the dive team members as several questions were raised and later answered by the group.

On November 3, the inspector observed diving operations in the spent fuel pool where two hydraulic cylinders were installed on the fuel handling upender assembly. The inspector verified the radiological controls technician properly positioned all the required dosimetry on the diver per the special work permit. The inspector observed communications between the diver and the support personnel as the diver entered the

SFP, descended to the work area, and performed an area survey. Communications were clear and concise. Repeat back 3-way communications between the divers and BGE personnel were noted. BGE personnel were observed to be alert and attentive during the dive.

On November 10, 1999, spent fuel pool diving maintenance activities were completed as scheduled. All planned activities were completed with no adverse conditions noted.

c. Conclusions

BGE personnel performed a well organized and comprehensive pre-evolution brief prior to spent fuel pool diving maintenance activities. The brief was attended by dive personnel, radiological controls, maintenance, and management personnel. Good interaction between participants was noted.

**S1 Conduct of Safeguards and Security Activities**

S1.1 Backshift Security Turnover and Computer Compensatory Actions

a. Inspection Scope (71750)

The inspector observed shift turnover between the security supervisors and testing of the portal metal detectors at the protected area access control point during back shift hours. The inspector observed security compensation measures established while the security access control computer system was upgraded.

b. Observations and Findings

On the evening of November 8, 1999, the inspector observed the security shift supervisor turnover. The off-going supervisor clearly communicated to the on-coming supervisor security related activities performed during his shift and activities scheduled to be performed that evening with no abnormalities noted. The inspector observed a security officer performing BGE procedure SS-105, "Operation and Testing of Portal Metal Detectors." The inspector verified the testing was performed in accordance with BGE procedures thereby meeting their NRC approved security plan commitments.

On November 17, 1999, the automated site security alarm computer system was taken out of service to perform a scheduled Y2K hardware and software upgrade. On November 20, 1999, the Y2K upgrade was completed and tested satisfactorily.

c. Conclusions

The observed security shift supervisor turnover was formal and communications were concise. Testing of the portal metal detectors at the plant access control point was performed using BGE approved procedures.

## **V. Management Meetings**

### **X1 Exit Meeting Summary**

At the conclusion of the inspection, on December 13, 1999, the inspectors presented the inspection results to Mr. Katz and others of BGE management. BGE acknowledged the findings presented.

The inspector met with the licensee personnel at the conclusion of the inspection on November 19, 1999, and summarized the scope of the inspection and the inspection results. The licensee did not dispute the inspection findings at the meeting.

### **X2 Management Meeting Summary**

On October 20, 1999, sixteen members of the staff of the NRC Chief Financial Officer toured the Calvert Cliffs site with BGE staff and met with Mr. Cruse, BGE Vice President-Nuclear. The discussions were general in nature.

## ATTACHMENT 1

### Partial List of Persons Contacted

#### BGE

C. Cruse, Vice President, Nuclear Energy Division  
P. Katz, Plant General Manager  
K. Cellars, Manager, Nuclear Engineering  
L. Wechbaugh, Superintendent, Nuclear Maintenance  
M. Navin, Superintendent, Nuclear Operations  
B. Montgomery, Director, Nuclear Regulatory Matters  
S. Sanders, General Supervisor, Plant Engineering  
T. Sydnor, General Supervisor, Plant Engineering  
D. Holm, General Supervisor, Plant Operations  
T. Pritchett, Superintendent, Technical Support  
L. Smialek, Radiation Protection Manager  
C. Earls, General Supervisor, Radiological/Chemistry  
W. Price, Mechanical Maintenance, SFP Dive Team Leader  
M. Haney, Supervisor, Radiation Protection  
K. Mills, Supervisor, Plant Operations  
T. Bukowski, Vendor assessment Unit  
S. Collins, Plant Engineering, Electrical Engineering Unit  
G. Detter, Design Engineering  
G. Dockstader, Plant Engineering  
J. Isakson, ABB Combustion Engineering Nuclear Power  
P. Katz, Plant General Manager  
J. Kirkwood, Nuclear Regulatory Matters  
E. Matthias, NSSD  
J. McVicker, Procurement Engineering Unit  
A. Miranda, Project Management  
B. Montgomery, Nuclear Regulatory Matters  
P. Pieringer, Plant Engineering  
B. Rudell, Project Management  
M. Simpson, Design Engineering  
C. Sly, Nuclear Regulatory Matters  
T. Sydnor, GS, PES  
J. Thorp, Supervisor, Vendor Assessment Unit  
L. Williams, Plant Engineering

#### NRC

M. Evans, Chief, Division of Reactor Projects Branch 1

**INSPECTION PROCEDURES USED**

IP 71707	Plant Operations
IP 62707	Maintenance Observation
IP 61726	Surveillance Observation
IP 37551	Onsite Engineering
IP 71750	Plant Support Activities
IP 38707	Engineering Procurement

**ITEMS OPENED, CLOSED AND DISCUSSED**Opened

IFI	50-317&318/99-09-01	Inspector follow-up of concerns identified in the review of the administrative actions for maintaining operability determinations
IFI	50-317&318/99-09-02	Inspector follow-up of control of nonconforming circuit breakers.
IFI	50-317&318/99-09-03	Inspector follow-up of functional testing of circuit breakers under seismic conditions.

Closed

None

**LIST OF ACRONYMS USED**

ABB	Asea Brown Boveri
ABBCE	Asea Brown Boveri Combustion Engineering
ABBPDG	Asea Brown Boveri Product Development Group
BGE	Baltimore Gas & Electric Company
CDF	Core Damage Frequency
ECCS	Emergency Core Cooling System (Safety Injection and Containment Spray)
EDG	Emergency Diesel Generator
EOP	Emergency Operating Procedure
GL	Generic Letter
IFI	Inspector Follow-Up Item
IR	Issue Report
JPM	Job Performance Measure
kV	Kilo-Volts
LCO	Limiting Condition of Operations
LER	Licensee Event Report
LORT	Licensed Operator Requalification Training
MO	Maintenance Order
NPO	Nuclear Plant Operator
NRR	Nuclear Reactor Regulation
OD	Operability Determination
PRA	Probabilistic Risk Assessment
RCA	Root cause analysis
RPC	Radiological Protection & Chemistry
RPS	Reactor Protection System
SAT	Systems Approach to Training
SFP	Spent Fuel Pool
SM	Shift Manager
STP	Surveillance Test Procedure
UFSAR	Updated Final Safety Analysis Report
Vdc	Volts direct current