

April 3, 2000

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.  
05000317/2000-001 and 05000318/2000-001**

Dear Mr. Cruse:

This report transmits the findings of the safety inspection conducted by NRC Inspectors at the Calvert Cliffs Nuclear Power Plant from January 9, 2000 to February 26, 2000. The enclosed report presents the results of that inspection. 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. An engineering specialist inspector review of selected portions of engineering activities associated with shutdown safety and circuit breaker replacements identified no significant problems. A radiation safety specialist inspector identified some weaknesses in the implementation of programs for radioactive waste processing and transportation. When identified, your staff placed these matters into the corrective action system.

Based on the results of this inspection, the NRC has determined that two Severity Level IV violations of NRC requirements occurred. These violations are being treated as Non-Cited Violations (NCVs), consistent with Section VII.B.1.a of the Enforcement Policy. The NCVs are described in the subject inspection report and involved the failure to properly scale and manifest six offsite shipments of concrete rubble and the failure to verify authorization to receive radioactive material prior to transfer. If you contest these violations or their severity level, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, Region I, the Director, Office of Enforcement, and the Resident Inspector at the Calvert Cliffs facility.

Charles H. Cruse

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We appreciate your cooperation.

Sincerely,

/RA/

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

Docket/License Nos.: 50-317/DPR-53  
50-318/DPR-69

Enclosure: NRC Region 1 Integrated Inspection Report Nos. 05000317/2000-001  
and 05000318/2000-001

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**U.S. NUCLEAR REGULATOR COMMISSION  
REGION 1**

License Nos.: DPR-53; DPR-69

Docket Nos.: 50-317; 50-318

Report Nos.: 05000317/2000-001; 05000318/2000-001

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: January 9, 2000 to February 26, 2000

Inspectors: J. Scott Stewart, Senior Resident Inspector  
Fred L. Bower, Resident Inspector  
Tim L. Hoeg, Resident Inspector  
Ronald Nimitz, Senior Health Physicist  
Aniello Della Greca, Senior Reactor Engineer

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. 05000317/2000-001 and 05000318/2000-001**

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 specialist inspections in engineering, radioactive waste management, and radioactive material transportation.

**Operations/Maintenance**

Operators appropriately responded to a Unit 1 automatic reactor shutdown due to a failure in the rod control electrical circuitry. All safety systems functioned as designed. A non-safety valve failure (attributed to poor workmanship) caused operators to shut the main steam isolation valves to limit plant cool down. The removal of the normal reactor heat sink capability from service complicated the recovery from this shutdown. [01.2]

During a system walkdown, the inspectors identified a condensate storage tank level instrument line was vulnerable to freezing. When identified to the BGE staff, actions were taken to promptly repair the instrument line heat trace. [01.3]

**Engineering**

Review of a proposed safety related 4kV electrical distribution system modification identified that the modification was being developed in a "piecemeal" fashion and may adversely impact the approved 50.59 safety evaluation. BGE placed field work on hold until more detailed design and implementation planning could be completed to ensure safety margins were maintained. [E1.1]

BGE's applicability review of the Wolf Creek event in response to Generic Letter 98-02, Loss of Reactor Coolant Inventory and Associated Loss of Emergency Mitigation Functions While in a Shutdown Condition, was detailed and accurate. No vulnerabilities were identified that required design modifications or compensatory action by BGE. [E1.2]

BGE's testing of the Asea Brown Boveri supplied replacement circuit breakers was appropriate and identified a number of minor design deficiencies. The corrective actions to resolve identified deficiencies were acceptable. [E1.3]

**Plant Support**

BGE implemented acceptable programs in the areas of radioactive waste source evaluation, waste processing and handling, radionuclide scaling factors determination, and waste classification. A non-cited violation was identified associated with failure to correctly scale shipments of concrete rubble waste. [R1.2]

BGE implemented an acceptable radioactive material packaging and shipping program. Overall, packaged shipments of radioactive material were properly packaged and shipped. BGE suspended cask shipments pending review of cask loading and closure procedures for

## Executive Summary (cont'd)

consistency with recent vendor procedures. A non-cited violation was identified in the area of verification of authorization of a transferee to receive radioactive material. [R1.3]

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**ATTACHMENTS**

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

## Report Details

### Summary of Plant Status

Except as noted, both units produced power with small reductions from full power for turbine valve testing and low risk maintenance. Unit 1 automatically shutdown (tripped) on January 14 due to an electrical problem in the rod control system. After repairs, the unit was returned to power production on January 16, 2000. Unit 2 shutdown on February 18, to replace a primary safety valve, then was returned to power production on February 26.

### I. Operations

#### **O1 Conduct of Operations**

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

Plant operations were performed with a focus on nuclear safety. On January 15 and 16, the inspectors observed plant operators make preparations and conduct a reactor restart and return to power production following a Unit 1 reactor trip (O1.2). Startup preparations by BGE included pre-operational checklist verifications, specialized startup training for plant operators, and enhanced management oversight. The return to criticality and power escalation were conducted in a deliberate manner with added oversight by engineering personnel. Criticality, power escalation, and the return to full power were completed without problems.

On February 11, a Unit 2 primary safety valve (RV-200) began to exhibit seat leakage. Operations personnel appropriately responded to quench tank level and temperature alarms, documented the problem in the corrective actions system, and informed engineering and management personnel. Leakage was quantified at approximately 0.25 gallons per minute. The safety valve leakage required the operators to repeatedly drain and depressurize the quench tank. On February 18, BGE shutdown Unit 2 to replace the safety valve (RV-200). The inspectors observed selected portions of the plant shutdown and cooldown, which were performed in a controlled and deliberate manner. BGE effectively completed the relief valve replacement with no problems noted. The leaking relief valve was sent to the valve manufacturer (Dresser Valve Company) for diagnostic evaluation. Unit 2 was returned to power operation on February 26.

During the February 25 startup, operators reached the upper limit of the estimated critical condition (rod position) without achieving reactor criticality. In accordance with operating procedures, the reactor was placed in a stable condition, a second estimated critical condition was calculated, and Issue Report IR3-039-527 was initiated to investigate the cause for the failed initial attempt. On the second attempt, reactor criticality was achieved within the acceptance range of the re-calculated estimated critical rod position. The cause for not having achieved criticality on the initial estimated critical condition was still being investigated at the close of this inspection period.

O1.2 (Closed) Licensee Event Report (LER) 05000317/2000-001: Reactor Trip Due to Motor Generator Local Voltage Adjust Handswitch Failure

a. Inspection Scope (71707, 92700)

The inspectors observed the plant response to a Unit 1 automatic reactor shutdown (trip) on January 14, 2000, at approximately 9:50a.m. The inspectors observed BGE recovery activities, including determination of the cause of the trip and corrective actions. The associated LER was also reviewed.

b. Findings and Observations

The inspectors promptly responded to the control room and observed operator response to the trip, including their use of the emergency operating procedures to diagnose the event and stabilize the plant. The inspectors observed that the operators effectively implemented the emergency operating procedures, maintained good oversight and control of plant systems, and conducted frequent crew briefings that included plant status and anticipated activities.

During the event, primary plant temperature (measured via T-cold leg) did not stabilize and operators shut the main steam isolation valves to minimize the temperature decrease, per procedure. Subsequent investigation determined that the cause of the unexpected plant cool-down was that the main steam supply valve to the No. 11 moisture separator-reheater, 1MOV-4025, failed to automatically close. This valve failure was documented in Issue Report No. IR3-048-340 for follow-up and corrective action.

The plant trip was documented in Issue Report No. IR3-036-310 and the plant general manager directed that a Significant Issues Findings Team (SIFT) investigate the event. On January 15, the SIFT determined that a faulty voltage adjust handswitch for the No. 11 control element drive motor generator set caused a spurious voltage increase on the control element assembly (rod control) electrical bus. This voltage increase caused both the Nos. 11 and 12 motor generators to isolate electrically. The loss of electrical power to the control element assemblies resulted in all control elements inserting, a main turbine trip, and a reactor trip. The SIFT investigation concluded that all safety systems operated as designed during the transient. BGE replaced the voltage adjust switch and the plant was returned to power on January 16.

BGE investigation of the valve 1MOV-4025 failure identified that there was a shorted lead in the motor operator. The lead shorted due to chafing. BGE attributed the chafing to poor workmanship, in that, it was known that the valve was subjected to flow-induced vibration and the internal motor leads had not been properly secured. The specific corrective action for the failed motor-operated valve were adequate, but the inspectors noted that BGE did not thoroughly evaluate the extent of condition of the poor workmanship which caused this problem. The licensee acknowledged this observation and entered the issue into the corrective action program.

BGE reported the reactor trip in accordance with 10 CFR 50.72 and 50.73. Inspector review of the LER identified that the safety analysis of the event concluded, qualitatively,

that the event resulted in no undue risk to the health and safety of the general public. Through discussions with the BGE risk assessment personnel, the inspector determined that BGE estimated the conditional core damage probability (CCDP) for this event to be  $4 \times 10^{-6}$  per year. This was an approximate three times normal increase for the transient (reactor trip), due to the loss of normal heat sink capability associated with closing the main steam isolation valves. The inspectors verified that the licensee's CCDP value was consistent with values calculated by the NRC Senior Reactor Analyst. The inspectors verified BGE had initiated or completed the corrective actions stated in the LER. BGE management also acknowledged the inspectors' observation regarding a more detailed risk assessment of the event. The LER was consistent with the findings of the SIFT report and the inspectors' understanding of the events. This LER is closed.

c. Conclusions

Operators appropriately responded to a Unit 1 automatic reactor shutdown due to a failure in the rod control electrical circuitry. All safety systems functioned as designed. A non-safety valve failure (attributed to poor workmanship) caused operators to shut the main steam isolation valves to limit plant cool down. The removal of the normal reactor heat sink capability from service complicated the recovery from this shutdown.

O1.3 Review of Cold Weather Freeze Protection Implementation

a. Inspection Scope (71707)

The inspectors performed a walkdown of the condensate storage tanks which were included in BGE's freeze protection program. The inspectors also reviewed BGE's adherence to administrative controls contained in operations performance evaluation (PE) O-102-4-O-M, "Freeze Protected Equipment."

b. Observations and Findings

On January 18, the inspectors walked down heat trace on the Nos. 11, 12, and 21 condensate storage tanks. The heat tracing circuit power "on" lights indicated heat tracing was energized. The inspector noticed that the enclosure for the No. 11 tank level instrument was cold to the touch. The Nos. 12 and 21 storage tank instruments were warm as expected from the heat tracing. The inspector notified the control room of this condition and plant operators promptly informed the system engineer who responded by measuring the surface temperatures on the level instrumentation. The temperature was the ambient temperature, 32 degrees Fahrenheit. BGE documented the potential freezing of the line in their corrective action system as IR-048-343.

BGE installed a temporary heating device to prevent freezing of the instrumentation. The No. 11 storage tank was the normal supply for the Unit 1 condensate and feed system and the backup supply for the auxiliary feedwater system. The No. 11 tank was non-safety-related and this freeze protection deficiency posed no significant risk to the safe operation of the reactor plant. During the week of January 31, BGE successfully repaired (MO1200000255) the heat trace to the transmitter.

c. Conclusions

During a system walkdown, the inspectors identified a condensate storage tank level instrument line was vulnerable to freezing. When identified to the BGE staff, actions were taken to promptly repair the instrument line heat trace.

## II. Maintenance

### **M1 Conduct of Maintenance**

#### M1.1 General Comments

BGE optimized a scheduled maintenance outage on Unit 2 by selectively including maintenance activities which were on their forced outage work list. Overall, the maintenance outage was successful in repairing equipment and components important to reactor safety, including pressurizer safety valve RV-200.

#### M1.2 Routine Maintenance Observations

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:

MO2199905178	U2 RPS Channel B Troubleshooting
MO1199903580	No. 11 BAST Discharge Relief Valve - 1RV132
MO2199700426	Replace Existing Tubing of 2B EDG Lube Oil
MO2199900094	Inspect 2B EDG Generator (Electrical)
MO1199605436	No. 12 Battery Replacement

b. Observations, Findings, and Conclusions

There were no problems identified in maintenance. During the review of selected maintenance activities, the inspectors observed that technicians were experienced and knowledgeable of their assigned duties. Maintenance personnel practiced peer-checking and self-verification while performing work. Minor discrepancies were properly addressed by BGE.

### M1.3 Routine Surveillance Observations

#### a. Inspection Scope (61726)

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

STP-O-08A-2	2A EDG Operability Test
STP-O-65H-2	Power Operated Relief Valve Block Valve Test
STP-O-73I-1	High Pressure Safety Injection Pump Test
STP-O-05A-2	No. 21 Auxiliary Feedwater Water Pump Test
ETP-00-01	Control Element Assembly No. 52 Testing

#### b. Observations, Findings, and Conclusions

There were no problems observed in the surveillance area. The selected surveillance activities were performed safely and in accordance with approved procedures. Test details were discussed at a pre-test briefing followed by a question and answer session attended by all test participants. The test participants were knowledgeable of their assigned responsibilities. Supervisory and engineering personnel participation was observed and management expectations for the proper conduct of testing were closely followed.

## **III. Engineering**

### **E1 Conduct of Engineering**

#### E1.1 Review of Proposed Electrical Modification

##### a. Inspection Scope (37551)

The inspectors evaluated the activities associated with a modification to the Class 1E electrical distribution system.

##### b. Observations and Findings

BGE informed the inspectors of a modification being installed that would allow the safety related 1A emergency diesel generator (EDG) to provide back-up power to the engineering and warehouse facilities located outside of the protected area. These facilities normally received electric power from an offsite supply, not directly controlled by BGE. This proposed power connection between the safety related 4kV bus 17 (1A EDG bus) and the site distribution system was being installed to provide discretionary loading for the 1A EDG. Spare safety related breaker No. 152-1705, on Bus 17, would provide the qualified electrical boundary between bus 17 and the non-safety related site distribution system.

The inspectors were informed that the engineering staff had prepared a 50.59 evaluation for the cross-tie modification and had presented the evaluation to the Plant Operational Safety Review Committee (POSRC) on December 29, 1999. The POSRC

meeting minutes documented that the POSRC had approved the evaluation. The approval stipulated that the cross-tie control circuitry would be equipped with a safety injection actuation system isolation function and an under-voltage protection feature. In addition, a keyswitch would be installed to permit operators to bypass these features, as necessary.

The inspectors reviewed the 50.59 evaluation and the available modification documentation and discussed the modification design and implementation with responsible engineering staff and managers, and POSRC members. The inspector noted that, unlike typical modification packages prepared by BGE, there was no available project plan or conceptual design document for the proposed modifications. Discussions with the responsible engineering personnel identified that there was not a common understanding of many of the key attributes of the modification design and that much of the detailed design and systems interfacing activities were being developed in parallel with the field installation.

The inspectors questioned station management about various aspects of the proposed modifications including key design details, operational coordination of the cross-tie installation, and synchronization of electrical power sources. The inspectors noted that the approved 50.59 safety evaluation did not fully address many of these items and raised a concern that this seemingly “piecemeal” or incremental modification development may adversely impact the approved 50.59 evaluation. BGE management acknowledged the atypical approach to development and installation of this electrical modification and the vulnerability to the approved safety evaluation. Accordingly, a hold was placed on any further field work associated with this modification, pending further evaluation and design development.

c. Conclusions

Review of a proposed safety related 4kV electrical distribution system modification identified that the modification was being developed in a “piecemeal” fashion and may adversely impact the approved 50.59 safety evaluation. BGE placed field work on hold until more detailed design and implementation planning could be completed to ensure safety margins were maintained.

E1.2 Review of Generic Letter 98-02 Response

a. Inspection Scope (TI-2515/142)

The inspector reviewed BGE efforts to determine if a potential drain down path of the reactor coolant system could be created by operator or equipment failure, similar to the occurrence at Wolf Creek, as discussed in Generic Letter (GL) 98-02, Loss of Reactor Coolant Inventory and Associated Loss of Emergency Mitigation Functions While in a Shutdown Condition.

b. Observations and Findings

On June 29, 1998, BGE completed an assessment of the September 17, 1994, Wolf Creek drain down event and concluded that Unit 1 and 2 were not susceptible to that event. Their conclusion was based on the design and operating differences existing between Calvert Cliffs and Wolf Creek. Relevant examples of such differences included: (1) separate suction headers, rather than a common header, to supply the emergency core cooling pumps from the refueling water tank; (2) two manually-operated valves, rather than a single motor-operated valve, to cross-connect the two shutdown cooling trains; and (3) simultaneous re-boration of the two shutdown cooling trains. BGE's evaluation had addressed several single and multiple component failures and the available means to detect such failures.

The inspector reviewed BGE's assessment and compared each evaluated condition and configuration to the applicable piping and instrument drawings. The inspector also independently reviewed the applicable Calvert Cliffs design and operating procedures to evaluate potential vulnerabilities not identified by BGE. The inspector concluded that BGE's engineering evaluation was acceptable and that the results were accurate. No further action was required by BGE to ensure that Calvert Cliffs was safeguarded from the Wolf Creek event.

c. Conclusions

BGE's applicability review of the Wolf Creek event in response to Generic Letter 98-02, Loss of Reactor Coolant Inventory and Associated Loss of Emergency Mitigation Functions While in a Shutdown Condition, was detailed and accurate. No vulnerabilities were identified that required design modifications or compensatory action by BGE.

E1.3 Replacement of General Electric Magne-Blast Circuit Breakers

a. Inspection Scope (37551)

The inspector reviewed BGE's evaluation and resolution of minor design issues associated with the replacement of General Electric (GE) breakers with Asea Brown Boveri (ABB) circuit breakers.

b. Observations and Findings

In 1997, BGE initiated a project to replace the GE safety related 4160V circuit breakers with equivalent ABB circuit breakers. The project was intended to resolve reliability issues affecting the GE Magne-Blast circuit breakers. The replacement breakers selected by BGE use vacuum technology and ABB was contracted to re-design their circuit breakers to fit into the existing switchgear cubicles, designed for the GE breakers.

Functionally and electrically the two breakers are equivalent, in that they are both designed to interrupt faults and prevent damage to the equipment they protect. BGE evaluated the electrical differences, including the impact of the different technology used for arc suppression. For instance, in some cases, the use of the vacuum breaker

required the addition of surge suppressors downstream of the breaker. In these cases, BGE fully evaluated the impact of the new breaker on the system.

For mechanical differences, BGE relied on the vendor to supply a component that was equivalent in form, fit, and function to the GE breakers. Nonetheless, BGE conducted sufficient testing to ensure that the essentially new breaker design conformed to the 4kV GE system. As a result of early testing, BGE identified some functional issues that were addressed through vendor re-design. For one such finding, BGE issued a 10 CFR Part 21 report. The NRC evaluated BGE's resolution of that Part 21 issue in Inspection Report Nos. 05000317 & 05000318/1999-009 (also see Section E8.1 of this report).

c. Conclusions

BGE's testing of the Asea Brown Boveri supplied replacement circuit breakers was appropriate and identified a number of minor design deficiencies. The corrective actions to resolve identified deficiencies were acceptable.

## **E8 Miscellaneous Engineering Issues**

### **E8.1 (Closed) Inspector Follow-Up Item 05000317 & 05000318/1999-009-02: Follow-up of the Control of Non-conforming Circuit Breakers.**

BGE identified a design defect that potentially could cause the Asea Brown Boveri (ABB) circuit breakers to undergo a "trip-free" operation. This finding resulted in BGE having to modify approximately 30 breakers that had been received from ABB, but not installed in the plant. The initial inspector follow-up of the 10 CFR Part 21 report identified that the breakers did not have non-conformance tags attached. Discussions with the BGE staff indicated that the breakers, although not tagged, had been placed on an electronic hold. At the time of the initial inspector review, BGE was not able to provide a procedure that appropriately governed this type of electronic hold process.

During follow-up this inspection period, the inspector verified that BGE had maintained the affected breakers on electronic hold and that a procedure addressing electronic "Class 3 Hold" was in place. However, that procedure applied primarily to equipment awaiting disposition as a result of expired shelf life. Therefore, the electronic hold placed on the deficient ABB breakers was not explicitly covered by existing procedures.

Inspector follow-up determined that for deficient equipment, station procedural guidance has the item tagged and segregated from equipment that is acceptable for use. The inspector confirmed through interviews that this process has generally been followed. Regarding the ABB circuit breakers, their size and quantity did not permit the same type of segregation. Therefore, the breakers were stored in two designated areas of the warehouse. Because all of the breakers were being modified, the BGE staff believed that no deficiency tags were required.

Based on the above review, the inspector concluded that proper implementation of plant procedures would have had each of the circuit breakers deficiency tagged. However, the inspector noted that the design problems were appropriately identified by BGE

during acceptance testing, were properly documented in the BGE corrective action program, were properly reported per 10 CFR Part 21, and were well understood by management and staff involved. Modifications to the breakers were in progress at the time of the initial inspector review. Therefore, the inspector follow-up concluded that BGE's use of an electronic hold and failure to affix deficiency tags on the ABB circuit breakers constitutes a minor procedural violation that is not subject to formal enforcement action. Clarifying procedure changes were being considered by BGE to address this issue. This inspector follow-up item is closed.

**E8.2 (Closed) Inspector Follow-Up Item 05000317 & 05000318/1999-002-03: Follow-up of Functional Testing of Circuit Breakers under Seismic Conditions.**

The NRC review of a seismic test report, which evaluated the ABB breakers' capability to actuate during and following a seismic event, determined that the breakers were functionally tested only at the nominal control voltage value (125Vdc). The inspector was concerned that immediately following the onset of a seismic event the dc voltage could drop to approximately 105Vdc and, therefore, there was no assurance that the breakers would close or open on demand.

Inspector follow-up determined that before and after each vibration test the laboratory conducted a functional evaluation of the breaker that included opening and closing at the minimum and maximum control voltage values, 90 Vdc and 140 Vdc, respectively. Regarding the lack of functional testing during vibratory motions, BGE provided an analysis that justified the acceptability of the results on the basis that, during seismic accelerations, the force required to open or close a breaker would constantly change, depending on the direction and intensity of the vibration. This force would oppose the closure force, for example, one instant and help it the next. Therefore, the results achieved at the end of a vibration test were also applicable during the test.

The inspector's review of the test report also determined that the parameters monitored during the tests included control voltage. During one of the vibration tests, this voltage dropped to between 65 and 70 Vdc for a period of 24 milliseconds. To address this anomaly, following the test, BGE conducted breaker functional tests at 60 Vdc. The breaker opened and closed successfully. Based on the above, the inspector concluded that the breakers were appropriately seismically qualified by BGE. This inspector follow-up item is closed.

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

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

**R1.1 General Comments (71750)**

On February 19, 2000, during back-shift hours, the inspector observed radcon and in-service inspection personnel perform an entry into the Unit 2 containment to inspect and take lube oil levels of all four reactor coolant pump motors. The pre-job brief was thorough and conducted in accordance with a pre-planned check-off list which included a review of the Special Work Permit (SWP), special tools required, communications,

and expected dose. The most recent survey maps were reviewed and understood by those participating in the entry. BGE personnel used self-checking and peer-checking to verify that the required dosimetry was properly worn prior to entry. The entry and inspection activities were performed as planned with no unusual conditions noted by the inspector.

## R1.2 Radioactive Waste Sources and Processing

### a. Inspection Scope (86750)

The inspector reviewed and discussed the following matters:

- sources of radioactive waste at the station, current waste generation rates, and volume reduction efforts;
- processing (as appropriate) and handling of the waste;
- development of scaling factors for difficult to detect and measure radionuclides and for routine and non-routine waste streams;
- classification and packaging of radioactive waste;
- processing of non-radioactive/non-contaminated trash shipped for disposal;
- implementation of applicable NRC Branch Technical Positions on waste classification, concentration averaging, waste stream determination, and sampling;
- current waste streams and their processing relative to descriptions contained in the Updated Final Safety Analysis Report (UFSAR) and the station's approved Process Control Program (PCP); and
- reporting of changes to the PCP and updating of the UFSAR to reflect changes.

### b. Observations and Findings

There were no significant changes in BGE's waste streams, processing, or storage methodology. BGE was processing and storing its waste consistent with information contained within the UFSAR and the process control program.

BGE generally verified its scaling factors for hard to detect radionuclides consistent with NRC Branch Technical Positions and implemented applicable technical positions on waste classification, concentration averaging, waste stream determination and sampling frequency for its various normal waste streams. However, BGE did not correctly scale the radionuclide mix for six shipments of contaminated concrete rubble waste, a non-routine waste stream. BGE made the waste shipments between February 2 and 16, 2000, and did not correctly scale-in transuranic radionuclides and include that information on the shipment Uniform Waste Manifest. 10 CFR Part 20, Appendix G required that specific information be provided on the Uniform Waste Manifest for shipping radioactive waste, including total radioactive material. BGE suspended shipments of the material, initiated action to correct shipping manifests, and placed this matter into its corrective action program (IR3-049-723). The failure to scale in the additional radionuclides did not affect packaging or classification and did not compromise the radiological safety of the shipments, but was a violation of regulatory requirements. This severity level IV violation is being treated as a Non-Cited Violation,

consistent with Section VII.B.1.a of the NRC Enforcement Policy. **(NCV-05000317&05000318/2000-001-01)**

BGE was processing its spent resin waste using a de-watering system for which an NRC approved Topical Report had been prepared. Performance data for the system indicated the de-watering system used by BGE was able to meet burial site waste de-watering criteria. However, the vendor operating procedure referenced a method for verifying filter clogging that did not appear to be included in BGE's approved de-watering procedure. BGE placed this matter into its corrective action system (IR No. IR3-033-655) and initiated a review of de-watering activities.

c. Conclusion

BGE implemented acceptable programs in the areas of radioactive waste source evaluation, waste processing and handling, radionuclide scaling factors determination, and waste classification. A non-cited violation was identified associated with failure to correctly scale shipments of concrete rubble waste.

R1.3 Radioactive Material Transportation Activities

a. Inspection Scope (86750)

The inspector reviewed the following aspects of BGE's radioactive waste and radioactive material packaging and shipping activities:

- radioactive waste shipping records;
- implementation of applicable shipping requirements including completion of waste manifests;
- implementation of the Certificates of Compliance (C of C) for NRC approved shipping casks;
- use of NRC approved shipping casks; and
- implementation of recent NRC and DOT shipping rule changes.

The inspector reviewed radioactive material shipments and observed a limited quantity shipment in preparation.

b. Observations and Findings

BGE implemented an acceptable radioactive waste packaging and shipping program. Overall, shipments of radioactive material were properly packaged and shipped. Survey documents for radwaste shipments were clear and radwaste shipment documentation indicated conformance with requirements. Program procedures required verification of cask Certificate of Compliance requirements. Radwaste shipment driver instructions provided for maintenance of exclusive use shipments and emergency notification information was properly included.

Although BGE met applicable lid torque requirements specified in the cask Certificate of Compliance for the 8-120B, Type B shipping cask, BGE's cask loading and closure

procedure did not include the additional lid closure torque instructions contained in the most recent vendor approved cask loading and closure procedure. BGE placed this matter into their corrective action program (IR3-033-654) and suspended cask shipments pending a review of this matter.

In December 1999, BGE was informed of a packaged sample (Shipment No. 99-147) containing a radionuclide that the recipient was not licensed to receive. The package and sample were returned. A review by BGE, identified nine additional instances where similar samples were shipped to a vendor (transferee) containing a radionuclide that was not specifically listed on the vendor's license. In these cases, the nuclide was below the exempt concentration specified in 10 CFR 30. BGE concluded that shipping personnel had not adequately reviewed the vendor's license to ascertain if the vendor was authorized to receive all of the types of radionuclides shipped as was specified in procedure RSP 2-204. BGE placed this issue into its corrective action program (IR Nos. IR3-033-653 and IR3-047-708), suspended similar shipments, suspended the qualifications of the involved individual, informed responsible individuals, and implemented additional supervisor oversight of the shipping activities pending review and implementation of long term corrective actions. None of the shipments resulted in any unsafe radiological condition.

The failure to verify that the transferee's license authorized receipt of the type, form, and quantity of radioactive material to be transferred is a violation of 10 CFR Part 30.41(c). This severity level IV violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy (**NCV-05000317&05000318/2000-001-02**)

c. Conclusions

BGE implemented an acceptable radioactive material packaging and shipping program. BGE suspended cask shipments pending review of cask loading and closure procedures for consistency with recent vendor procedures. A non-cited violation was identified in the area of verification of authorization of a transferee to receive radioactive material.

**R2 Status of RP&C Facilities and Equipment**

a. Inspection Scope (86750)

The inspector toured accessible portions of the radioactive waste collection and processing facilities. The inspector reviewed storage and handling practices, reviewed condition of facilities and equipment, and interviewed personnel involved with various waste processing activities.

b. Observations and Findings

The locations were found generally clean and well maintained. Shielding and decontamination (as appropriate) were performed to minimize radiation dose rates. Storage locations for radioactive materials were properly posted and secured.

c. Conclusion

BGE's waste processing, handling, and storage areas were clean and well maintained. Waste storage areas were properly posted.

**R5 Staff Training and Qualification**

a. Inspection Scope (86750)

The inspector reviewed initial and continuing training provided personnel involved in radioactive waste generating, processing, and handling activities.

b. Observations and Findings

Personnel involved with radioactive waste activities were knowledgeable of procedure requirements applicable to their assigned areas of responsibilities. BGE provided training to personnel in accordance with NRC Bulletin 79-19 guidance and 49 CFR 172, Subpart H. BGE maintained training records.

c. Conclusion

Personnel involved with radioactive waste activities were knowledgeable of procedure requirements and were provided training in accordance with NRC Bulletin 79-19 guidance and 49 CFR 172, Subpart H.

**R7 Quality Assurance in RP&C Activities**

a. Inspection Scope (86750)

The inspector reviewed audits, assessments, and surveillances of the radioactive waste handling, processing, storage, and shipping programs, as well as audits of the Process Control Program. The criteria used for this review were contained in the station quality assurance manual, 10 CFR 71, and applicable station audit and surveillance procedures.

b. Observations and Findings

BGE performed audits consistent with guidance in its quality assurance manual. Technical specialists were used (as appropriate) to perform audits. Audit activities were generally performance based and the identified concerns were entered into the corrective action program. Audit checklists were detailed and conclusions were supported by documented findings. The radiation safety organization actively initiated

issue reports for findings and an increase in self-identified issues was noted for 1999, as compared to 1998.

c. Conclusions

BGE provided improved audits of its radwaste processing, handling, storage, and shipping program. Audits were detailed and performance based. Self-identified findings were properly placed in the corrective action system.

**V. Management Meetings**

Following the conclusion of the inspection, on March 7, 2000, the inspectors presented the inspection results to Mr. Katz, Mr. Pritchett, and others of BGE management. BGE acknowledged the findings presented.

## Attachment 1

### PARTIAL LIST OF PERSONS CONTACTED

#### BGE

C. Cruse, Vice President, Nuclear Energy Division  
P. Katz, Plant General Manager  
T. Pritchett, Manager, Nuclear Engineering  
L. Wechbaugh, Superintendent, Nuclear Maintenance  
D. Holm, Superintendent, Nuclear Operations  
B. Montgomery, Director, Nuclear Regulatory Matters  
S. Sanders, General Supervisor, Radiation Safety  
T. Sydnor, General Supervisor, Plant Engineering  
K. Mills, General Supervisor, Plant Operations  
M. Navin, Superintendent, Technical Support  
C. Earls, General Supervisor, Chemistry  
T. Forgette, Director, Emergency Planning

### 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 86750	Solid Radioactive Waste Management and Transportation
IP 92903	Follow-up - Engineering
TI-2515/142	Drain Down During Shutdown and Common Mode Failure

### LIST OF ACRONYMS USED

ABB	Asea Brown Boveri
BAST	Boric Acid Storage Tank
BGE	Baltimore Gas and Electric
CC	Calvert Cliffs
CCDP	Conditional Core Damage Probability
CFR	Code of Federal Regulations
DC	Direct Current
EDG	Emergency Diesel Generator
ETP	Engineering Test Procedure
GE	General Electric
GL	Generic Letter
LER	Licensee Event Report
NCV	Non-Cited Violation
PCP	Process Control Program
PE	Performance Evaluation
POSRC	Plant Operational Safety Review Committee
RP&C	Radiological Protection and Chemistry

SIFT Significant Issues Findings Team  
 SWP Special Work Permit  
 UFSAR Updated Final Safety Analysis Report

### ITEMS OPENED, CLOSED AND DISCUSSED

#### Opened and Closed

05000317/2000-001-01	NCV	Failure to scale radionuclides in waste classification
05000318/2000-001-01	NCV	Failure to scale radionuclides in waste classification
05000317/2000-001-02	NCV	Failure to verify that the transferee's license authorized receipt of the type, form, and quantity of shipped radioactive material
05000318/2000-001-02	NCV	Failure to verify that the transferee's license authorized receipt of the type, form, and quantity of shipped radioactive material

#### Items Closed

05000317/2000-001	LER	Reactor Trip Due to Motor Generator Local Voltage Handswitch Failure
05000317/1999-009-02	IFI	Inspector follow-up of control of nonconforming circuit breakers.
05000318/1999-009-02	IFI	Inspector follow-up of control of nonconforming circuit breakers.
05000317/1999-009-03	IFI	Inspector follow-up of functional testing of circuit breakers under seismic conditions.
05000318/1999-009-03	IFI	Inspector follow-up of functional testing of circuit breakers under seismic conditions.