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Report Nos. 50-317/98-09, 50-318/98-09

Licensee: Baltimore Gas and Electric Company

Facility: Calvert Cliffs Nuclear Power Plant
Units 1 and 2

Location: 1650 Calvert Cliffs Parkway
Lusby, Maryland 20657

Dates: September 6, through October 24, 1998

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EXECUTIVE SUMMARY
Calvert Cliffs Nuclear Power Plant, Units 1 and 2
Inspection Report Nos. 50-317/98-09 and 50-318/98-09

This integrated inspection report includes 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 radiation safety, security, and motor operated valve engineering.

Plant Operations

The inspectors made routine control room visits and observed that the environment was maintained free of distractions. Operators were aware of plant conditions, promptly responded to alarms, and appropriately implemented technical specifications. The operators conducted shift changes in a professional and complete manner, including control board walkdowns, review of equipment status, and pre-shift briefings on the activities planned for the shift.

BGE released gases from the #13 Waste Gas Decay Tank in a safe and methodical manner. The performance of the nuclear plant operators during the evolution were notable with proactive concerns for system control and safety. Communications were clear and concise. BGE operations completed the release without problems.

The inspectors observed licensed operator training in the simulator and separately, two annual requalification examination scenarios conducted on operations crews. In both cases, the simulated events were mitigated in a safe manner using plant abnormal and emergency procedures. Crew communications were formal and accurate and periodic crew briefings were completed to keep the entire crew informed of plant status. Supervisory command and control was good. For the examination scenarios, all critical tasks were completed in a timely manner and both crews passed this portion of their exams.

Maintenance

BGE conducted maintenance in an acceptable manner. The inspectors noted that a large amount of maintenance on safety related systems was preventive in nature and that there had been a decrease in unplanned corrective maintenance from that in prior inspections. The inspectors found that BGE had effectively implemented their maintenance rule program for the spent fuel pool cooling and storage systems.

The surveillance testing observed by the inspectors during this period was done effectively and safely. Radiological controls used during data gathering across contaminated area boundaries had improved over previous inspection observations following training of radiation controls, operations, and testing personnel.

Executive Summary (cont'd)

Engineering

The NRC closed the Generic Letter (GL) 89-10, "Safety-Related Motor-Operated Valve Testing and Surveillance," program at Calvert Cliffs Nuclear Power Plant. BGE adequately verified the design-basis capability of safety-related motor-operated valves. Actions taken by BGE to provide support for its MOV program assumptions were acceptable. BGE implemented new industry guidance regarding Limitorque motor actuator capability in a timely manner. BGE implemented adequate measures to assure the design-basis capability of the pressurizer power operated relief valve block valves, the steam generator feedwater isolation valves, and the safety injection pump minimum flow recirculation valves.

Plant Support

Field observations of on-going work activities and station radiological controlled areas indicated BGE was effectively implementing its fundamental radiological controls requirements for external and internal exposure control.

BGE exhibited significantly improved management attention to the radiation protection program as evidenced by the program changes and enhancements made in response to identified problems. BGE was continuing to implement its radiation protection improvement plan (RPIP) in an effort to further improve the quality and implementation of its radiological controls program. Dedicated personnel were assigned to implement the RPIP and effect further improvement.

BGE effectively self-identified radiation protection program and personnel performance deficiencies through its review of work performed on the Unit 2 refueling bridge hoist box. BGE suspended the affected work activity and implemented appropriate corrective actions including performance of a root cause determination. Although a violation of Technical Specification 6.4, relative to implementation of radiation protection program procedures, was identified, BGE met the criteria specified in Section VII B.4 of the NRC Enforcement Policy for not citing the self-identified violations.

BGE was conducting security and safeguards activities in a manner that protected public health and safety in the areas of alarm stations, communications, and protected area access control of personnel, packages, and vehicles.

The BGE security facilities and equipment in the areas of protected area assessment aids, protected area detection aids, and personnel search equipment were determined to be well maintained and reliable.

BGE management support was adequate to ensure effective implementation of the security program including adequate staffing levels and resources to support programmatic needs.

The review of BGE security audit program indicated that the audit was comprehensive in scope and depth, that the audit findings were reported to the appropriate level of management, and that the program was being properly administered.

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ATTACHMENTS

Attachment 1:	Partial List of Persons Contacted
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	Items Opened, Closed and Discussed
	List of Acronymns Used

Report Details

Summary of Plant Status

Both reactors operated at full power throughout the inspection period except for minor power reductions for main condenser waterbox cleaning and main turbine valve testing.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Plant operations were conducted safely with a proper focus on nuclear safety. The inspectors made routine control room visits and observed that the environment was maintained free of distractions. Operators were aware of plant conditions, promptly responded to alarms, and appropriately implemented technical specifications. The operators conducted shift changes in a professional and complete manner, including control board walkdowns, review of equipment status, and pre-shift briefings on the activities planned for the shift. Both licensed and non-licensed plant operators routinely documented deficiencies in the BGE issue report system when problems, such as steam leaks or instrument problems were identified. Shift turnover conditions, technical specification limiting conditions of operation, and significant changes in safety equipment status were properly logged in the control room log.

Daily maintenance and surveillance activities were pre-planned and scheduled following assessment for cumulative core damage risk and plant trip risk. In all cases, overall plant risk was maintained at an acceptably low level by sequencing of testing and maintenance. The inspectors reviewed the BGE temporary modification packages and noted the evaluations appropriately documented that all of the affected safety systems remained operable, and the interim compensatory measures implemented by the temporary modifications did not change the facility as described in the updated final safety analysis report (UFSAR). No configuration control problems were identified in inspector observations of valve and switch positioning and tagout reviews.

The inspectors conducted routine walkdowns of plant safety systems and accessible spaces and found that BGE maintained the areas clean, free of fire hazards, and appropriately lit. Components were found in the correct position and deficiencies that had been identified were marked by green deficiency tags, indicating that they had been entered in the BGE corrective action system. No problems in the cleanliness or control of plant spaces were identified.

On October 7, 1998, the inspectors observed licensed operator crew simulator training sessions that included malfunctions in safety related cooling water systems and control element assembly position indication. On October 20, the inspectors observed the conduct of two simulator sessions of the BGE administered annual licensed operator requalification examination. Both the training session and the examination included evaluations of operating crew performance in the conduct of

abnormal operating procedures and emergency operating procedures, including diagnosis and classification of simulated events. The inspectors observed clear three-way communications and good supervisory command and control throughout the sessions. The licensed operators correctly identified the simulated abnormal conditions and used correct procedures to mitigate the transients. For the examination, BGE determined that all crew critical tasks were met in a timely manner and no examination failures were observed by either the BGE examiners or the inspectors. Emergency events were correctly classified within time expectations. The inspectors reviewed simulator control board consistency with the actual control boards in the control room and identified no discrepancies.

During the inspection period, BGE identified a number of administrative problems with UFSAR Chapter 15, Technical Requirements Manual (TRM). This chapter had been implemented as part of the conversion to improved technical specifications in August 1998. The problems involved typographical errors, inadvertent deletions, and needed clarifications to the TRM to make it coincide with the old technical specifications. BGE entered the issues in their corrective action system. Separately, a problem with wording of reactor protective system instrumentation operability requirements in the new technical specifications was identified and on October 16, 1998, BGE requested an exigent license amendment from the NRC to correct the problem.

01.2 Waste Gas Decay Tank Release Observation

a. Inspection Scope (71707)

On September 29, the inspectors observed and assessed BGE operations in venting a waste gas decay tank to the environment in accordance with technical specifications and BGE approved procedures.

b. Observations and Findings

On September 29, BGE chemistry requested the operations department to release #13 Waste Gas Decay Tank. BGE chemistry provided the control room operators with a gaseous release permit that included the release criteria. The inspector verified the release permit was complete and had the required approval signatures. The senior reactor operator and chemistry personnel were observed discussing the release permit and demonstrated a mutual understanding of the release criteria.

The inspector noted the auxiliary building operator had not previously experienced a waste gas decay tank release and proactively reviewed the procedure and walked down the system prior to performing the release. The operator was observed locating valves and instruments to be used. As required by radiological safety program postings, the operator obtained concurrence from the local radiation survey technician (RST) to work on several valves that were in overhead areas.

The inspectors reviewed waste gas release operating instruction and found it to be detailed and accurate. During the afternoon on September 29, the #13 waste gas

tank was released using the Unit 2 plant vent. The release was accomplished without difficulty and the expected indications were observed. The operators practiced self-checking and followed applicable special work permit requirements. The inspectors observed procedural verbatim compliance. Excellent repeat back communications were observed between the auxiliary operator and the control room operator while initially setting the release flow rate.

c. Conclusions

BGE released gases from the #13 Waste Gas Decay Tank in a safe and methodical manner. The performance of the nuclear plant operator during the evolution was notable with proactive concerns for safety and system operation. Communications were clear and concise. BGE operators completed the release safely and without problems.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments

a. Inspection Scope (62707)

The inspectors reviewed maintenance activities and focused on work that involved systems and components important to safety. The inspectors directly observed and reviewed all or portions of the following work activities:

MO1199803569	#12 Rad Waste Filter replacement
MO1199706178	1A Diesel instrumentation clean and inspect
MO1199703191	12 Charging Pump re-packing and inspection
MO1199703069	Control Room Door Hinge replacement
MO2199706445	Intake Unit 1 J-Box & 1J027A Repair
MO2199801368	22 Saltwater Pump Bearing Lubrication
MO2199801783	22 Servicewater Pump Bearing Housing Oil Leak Repair
MO2199801221	22 Servicewater Pump Oil Sampling
MO0199701185	Spent Fuel Pool Pump Discharge Check Valve Overhaul
MO0199801231	Replace Spent Fuel Pool Filter
MO1199801939	Replace 11 HPSI Pump Stuffing Box Supply Union Fitting
MO1199801464	Repair Leaks on 11 HPSI Stuffing Box Cooling
MO1199604687	13 Charging Pump Discharge Desurger Repair
MO2199801449	Preventive Maintenance 21 HPSI Pump Breaker and Relays

b. Observations and Findings

The inspectors observed that an increasing amount of work performed at Calvert Cliffs was preventive in nature, as opposed to corrective. During the inspection period, there were no plant transients resulting from equipment failures and the number and significance of unplanned work had been reduced from prior

inspections. No significant maintenance preventable failures were identified by the inspectors during the inspection period.

The inspectors observed a spent fuel pool filter replacement due to high differential pressure on the filter following routine fuel handling activities. BGE informed the inspectors that filters were typically replaced when differential pressure increased or when high radiation (1 rad) was measured on the outside of the filter housing. Both replacement triggers were preventive in nature and assured that the filter remained both effective in filtering and adequately low in radiation to allow changeout without a significant radiological hazard. The inspectors attended the pre-job briefing and observed that the maintenance supervisor discussed how the job would be accomplished, including specific duties and responsibilities of the involved workers. Additionally, the assigned radiological controls technician briefed the workers on expected radiological conditions, stop work criteria, special radiation work controls, and measures to assure that exposure remained as low as achievable. Contingency plans should problems be encountered were also discussed. The inspectors noted replacement went well and no problems were identified.

The inspectors reviewed the maintenance rule status of the spent fuel pool cooling and spent fuel storage systems and found that the systems had been designated a(2) under the rule (10 CFR 50.65). Performance criteria had been established for each system, including safe storage of spent fuel, adequate cooling of spent fuel in the pool during normal and emergency conditions, and maintaining the ability to isolate the spent fuel pool system from containment. Performance monitoring included monitoring of pool cooling pump availability, control of spent fuel pool water chemistry, checks on system integrity and pool leakage, and bi-annual checks on boraflex performance. The inspector discussed the performance of these systems with the responsible system engineer and found that each monitoring criterion was individually assessed in August 1998 to allow an assessment of the overall system performance. The final assessment was then provided to station management for their review. In general discussions with BGE management concerning the maintenance rule program, the inspectors were informed that BGE intended to conduct a review of all a(1) systems under the rule to determine if appropriate actions were being taken to assure operational performance and return the systems to a(2) status.

c. Conclusions

BGE conducted maintenance in an acceptable manner. The inspectors noted that a large amount of maintenance on safety related systems was preventive in nature and that there had been a decrease in unplanned corrective maintenance from that in prior inspections. The inspectors found that BGE had effectively implemented their maintenance rule program for the spent fuel pool cooling and storage systems.

M1.2 Routine Surveillance Observations

a. Inspection Scope (61726)

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

STP-O-73J	Low Pressure Safety Injection Pump Test
STP-M-211	Secondary CEA Position Display Test
STP-O-73D	Charging Pump Performance Test
STP-O-73K	Containment Spray Pump Operability Test
STP-O-73B	Service Water Quarterly Operability Test
STP-O-65J	HPSI Pump Discharge Check Valve Closure Test
STP-O-8A	1A Diesel Surveillance PMT Slow Speed Start
STP-O-73K	Containment Spray Pump Operability Test
STP-M-171	Containment Air Lock Gasket Seal Air Test
STP-O-47A	MSIV Partial Stroke Test
STP-O73A	Salt Water Pump Performance Test
STP-O73I	11 HPSI Pump and Valve Quarterly Test

b. Observations and Findings

The inspectors found that the selected surveillance activities were performed safely and in accordance with approved procedures. Test details were discussed at pre-test briefings that included question and answer sessions attended by all test participants. Calvert Cliffs and industry events associated with the testing were typically discussed. The test participants appeared knowledgeable of their assigned responsibilities and procedures used. Engineering participation was clearly observed in the preparation for and conduct of the tests.

The inspectors observed that minor discrepancies noted during the tests were properly entered into the BGE corrective action system. Radiological controls used during data gathering across contaminated area boundaries had improved over previous inspection observations following training of radiation controls, operations, and testing personnel. In particular, items that crossed into the contaminated area remained in the area until surveyed by a radiological controls technician. Instrument lines that crossed the contaminated area boundary were temporarily tethered to the boundary. The inspectors observed radiological controls technicians taking surveys and swipes to ensure contamination was controlled.

c. Conclusions

The surveillance testing observed by the inspectors during this period was done effectively and safely. Radiological controls used during data gathering across contaminated area boundaries had improved over previous inspection observations following training of radiation controls, operations, and testing personnel.

III. Engineering

E1 Conduct of Engineering

E1.1 NRC Generic Letter 89-10 Program (Temporary Instruction 2515/109)

a. Inspection Scope

The NRC conducted the Generic Letter 89-10, Part 1 inspection at Calvert Cliffs Nuclear Power Plant (CCNPP) in August 1991 (NRC Inspection Report (IR) 50-317&318/91-81). A Part 2 inspection in April 1994 was documented in IR 50-317&318/94-17. An inspection in early 1997 that evaluated completion of the GL 89-10 program at CCNPP in accordance with Part 3 was documented in IR 50-317&318/97-02. The purpose of this inspection was to verify completion of the remaining items identified for closure of the NRC review of the GL 89-10 program at Calvert Cliffs.

b. Observations and Findings

The inspectors reviewed the removal of the main steam isolation valve bypass valves from the scope of BGE MOV program. Based on the determination in Engineering Service Package (ESP) No. ES199701511-000 that the main steam isolation bypass valve (MSIV-BPV) does not perform a safety function, BGE removed the MSIV-BPVs from their GL 89-10 program. The inspectors confirmed through review of the UFSAR (Chapter 6) that the bypass valves and do not receive a signal to automatically position as part of a protective function.

The effect of an open MSIV-BPV on the applicable design-basis events analyzed in the UFSAR (Chapter 14) for the hot zero power condition was determined to be negligible. The effect on design basis events which occur at power was not evaluated because the valves are presumed to be closed at all times during power operation. BGE was evaluating establishment of administrative controls to ensure the MSIV-BPVs remain closed during power operation. The inspectors found that removal of the main steam isolation bypass valves from the MOV program was consistent with guidance provided by the NRC in Supplement 6 of GL 89-10.

In NRC Inspection Report 50-317&318/97-02, the inspectors concluded BGE had established an adequate MOV trending program as recommended in GL 89-10, but that the program had not been effective in fully evaluating the performance of power operated relief valve (PORV) block valve 1-MOV-403 in response to a leakage problem. BGE provided guidance for the MOV trending program in BGE Plant Engineering Section Guideline PEG-15, "Motor Operated Valve Program." As noted in section E8 of this report, the inspectors found BGE was adequately reviewing MOV performance for trends.

c. Conclusions

The inspectors found that removal of the main steam isolation bypass valves from the MOV program was consistent with guidance provided by the NRC in Supplement 6 of GL 89-10. The inspectors determined BGE was taking adequate action regarding the program for trending MOV performance.

E8 Miscellaneous Engineering Issues (IP 92903)

E8.1 (Closed) Followup Item 50-317&318/97-02-07: MOV Sizing and Switch Settings

a. Inspection Scope

The inspectors reviewed the actions taken by BGE to provide validation of their GL 89-10 assumptions.

b. Observations and Findings

The NRC identified in NRC Inspection Report 50-317&318/97-02 that BGE's assumptions for valve factor, load sensitive behavior, and stem friction coefficient were conservative and acceptable for closure of the NRC's review of BGE's GL 89-10 program. However, because of the small amount of in-plant dynamic test data obtained, the inspectors concluded that the bases for these assumptions for non-tested MOVs could be improved by obtaining additional information as part of the BGE long-term MOV program.

Review of BGE analysis of test information for the period between September 1996 and August 1997 in "Motor-Operated Valve (MOV) Trending Report - CCNPP Report Number 2," indicated that the results of the tests were consistent with BGE GL 89-10 program design assumptions. No concerns were identified regarding the formal analysis, but improvements in the description of the parameters trended and the analysis performed were discussed with BGE.

A formal report documenting analysis of the test information collected since August 1997 had not been prepared. The test information had been reviewed when obtained and BGE had prepared several internal Issue Reports (IRs) in response to test anomalies or problems. Several examples are discussed below:

- IR3-005-795, dated May 6, 1998: as-found test of valve 1-MOV-651 revealed an increase in the maximum thrust output as a result of an apparent reduction in the stem friction coefficient.
- IR3-004-732, dated August 10, 1998: diagnostically test 1-MOV-651 during the next refueling outage in 2000 to verify that the stem friction coefficient is not degrading.

- IR3-005-777, dated March 19, 1998: diagnostic test of valve 2-MOV-405 revealed a stem friction coefficient greater than the 0.20 value assumed in the design calculations.
- IR3-005-787, dated April 17, 1998: as-found test of valve 1-MOV-646 revealed actuator output thrust lower than the previous test.

A summary of recent test information provided by BGE further supported MOV program assumptions. No significant concerns were identified.

The inspectors documented in NRC Inspection Report 50-317&318/97-02, that BGE had applied the standard industry gate valve equation to globe valves test results. This practice had been known to result in nonconservative valve factor evaluations. The inspectors found that BGE had revised CCNPP Administrative Procedure EN-1-114, "Motor Operated Valve Program," and CCNPP Technical Procedure ETP 98-005R, "Differential Pressure Testing of Auxiliary HPSI Header Loop isolation MOV, 1-MOV-627," to incorporate the standard industry equations. However, the inspectors found minor inconsistencies in the globe valve equations used in these documents. In response, BGE initiated an issue report (IR3-018-780) on September 10, 1998, to correct the equations. The inspectors did not identify any valve operability concerns regarding the inconsistencies.

BGE formally documented its review of the NRC safety evaluation and the limitations and conditions for the use of the Electric Power Research Institute (EPRI) MOV Performance Prediction Methodology (PPM) in an internal memorandum dated September 30, 1997. The applicability of the EPRI methodology to gate valves larger than 18 inches had also been reviewed and documented in an internal BGE memorandum dated March 19, 1998. BGE considered the EPRI model to provide the best available information on large gate valves. As indicated in the memorandum, BGE planned to monitor information from other plants and the industry with respect to gate valve size and evaluate the information for impact on the MOV calculations at Calvert Cliffs as part of its periodic verification program.

BGE addressed new industry guidance on Limitorque motor actuator output capability, using gear pullout efficiency in its MOV sizing and switch setting calculations and a 0.9 application factor in design calculations. BGE documented its evaluation of Limitorque Technical Update 98-01 and its Supplement 1 in ESP No. ES199801215-000. BGE prepared issue reports (IR3-004-735 and 736 on September 3, 1998), to address inadequate margin identified for valves 2-MOV-269 and 663, respectively, in their closing (non-safety) direction although adequate margin was available in the opening (safety) direction.

BGE generally applied the published rating for actuator spring packs in its MOV calculations. In some cases where spring pack rating was the limiting parameter for actuator capability, BGE applied actual test data for the specific spring pack following guidance in Calvert Cliffs Maintenance Procedure MOV-010, "MOV Spring Pack Testing."

c. Conclusions

Actions taken by BGE to provide additional support for its GL 89-10 program assumptions were found to be acceptable and IFI 317&318/97-02-07 was closed. BGE incorporated new industry guidance on Limit torque motor actuator output capability in a timely manner. Design assumptions for valve factor, load sensitive behavior, and stem friction coefficient were acceptable to support closure of the NRC review of the BGE GL 89-10 program.

E8.2 (Closed) Violation 50-317&318/97-02-08: Design Basis Capability of Block Valves MOV-403 & 405

In IR 97-02, the inspectors concluded the power operated relief valve block valve switch settings were incorrect and challenged the acceptability of the assumed 0.30 valve factor (VF). The inspectors also concluded that BGE had taken inadequate corrective action following repair of PORV block valve 1-MOV-403, in April 1996. A violation was issued for failing to evaluate the capability of the blocking valve to function under design-basis conditions in the degraded condition and to evaluate the operability of the other three PORV block valves.

BGE abandoned use of the 0.30 VF and established new thrust requirements and valve factors (ranging between 0.50 and 0.60) using the EPRI PPM program. To support the PPM calculations, BGE determined the actual valve internal dimensions and replaced the valve wedges (disks) with new wedges machined to provide optimal performance characteristics. The inspectors reviewed work orders performed to replace the PORV block valve wedges and obtain the internal valve dimensions, and the design calculations containing the EPRI PPM runs. The inspectors did not identify any problems.

The approach and assumptions contained in BGE design calculation CA03556, "Pressurizer Pressure During An Inadvertent PORV Lift," (which established the design-basis differential pressure and line pressure used in the EPRI PPM calculations) were found to be reasonable. A torque switch bypass modification was confirmed to be complete for the both Unit 1 and Unit 2 PORV block valves, allowing BGE to take credit for full motor capability for the entire valve stroke. Additionally, the minimum voltage ratings of the valves were improved by relay and wiring modifications.

The inspectors determined that the PORV block valves had adequate capability with design margins of approximately 8-12%. Further improvement in the design-basis capability of the PORV block valves was under consideration and was planned to be addressed as part of Calvert Cliffs long term MOV program.

The inspectors reviewed the BGE response to the Notice of Violation and confirmed that BGE had adequately determined the PORV block valves had been operable in their degraded condition. The inspectors verified that commitments to train additional personnel on the EPRI PPM and to perform overview training to ensure

affected organizations understand the effects of maintenance and modifications on the operability of MOVs were complete. The violation is closed.

E8.3 (Closed) Followup Item 50-317&318/97-02-09: Steam Generator Feedwater Isolation Valve Design Capability

Due to low available thrust margins and questions regarding determination of the design basis differential pressure of the steam generator feedwater isolation valves, the inspectors questioned the design basis differential pressure value of 275 psid and the established torque switch settings for MOV 4516 and 4517.

BGE reverified the design basis differential pressure calculated in CA04278, "Maximum Line and Differential Pressure Calculation for 1(2)-MOV 4516 and 4517." Also, a key assumption that the main feed pumps would not provide significant pressure 30 seconds after being tripped was validated by the pump vendor based on past experience.

Completion of BGE planned electrical modifications and improved analytical methods increased the available margin for three of the four valves. Valve 2-MOV-4516 remained the only valve with less than a ten percent margin (at 3.4%). BGE planned to improve the available margins of the feedwater isolation valves by obtaining actual internal valve dimensions and re-running the EPRI PPM in early 1999. The inspector followup item is closed.

E8.4 (Closed) Followup Item 50-317&318/97-02-10: Safety Injection (SI) Pump Minimum Flow Isolation Valves

NRC Inspection Report 50-317&318/97-02 established the followup item to allow the inspectors to review BGE efforts to improve its valve factor basis and resolve any margin concerns for the SI pump minimum flow. The inspectors confirmed that an acceptable valve factor basis had been established and that no margin concerns existed. BGE replaced the previous valve factors of 0.2 to 0.3 with a more industry proven value of 0.7 for gate valves. Based on revised calculations, the identified field margins were all in excess of 180%. Review of design calculation CA03769, "ECCS Minimum Flow Recirculation to RWT" supported the design basis differential pressure (2 psid) used in the revised MOV thrust calculations. The followup item is closed.

E8.5 (Closed) Followup Item 317&318/97-02-11: Pressure Locking and Thermal Binding

a. Inspection Scope

In Inspection Report 50-317&318/97-02, a followup item was established to review BGE's continuing evaluation of gate valves susceptible to pressure locking and thermal binding and the BGE response to GL 95-07, "Pressure Locking and Thermal Binding of Safety-Related Power-Operated Gate Valves." The inspectors reviewed actions taken by BGE in response to those items.

b. Observations and Findings

In response to concerns regarding the reliability of its previous methodology, BGE recalculated the thrust required to overcome potential pressure locking for the following valves using a methodology developed by Commonwealth Edison Company (ComEd):

MOV-504	Charging pump suction from refueling water tank
MOV-514	Boric acid pump discharge
MOV-4144 & 4145	Emergency sump recirculation
MOV-6900, 6901 & 6903	Containment hydrogen purge
MOV-651 & 652	Instrument air containment isolation

Based on the updated pressure locking calculations, BGE identified two valves on each unit, MOV-651 & 652, that did not satisfy the design requirements for actuator capability to overcome the predicted opening forces. An evaluation prepared by BGE on January 30, 1998, justified the continued operability of these MOVs until modifications could be performed to resolve potential pressure locking concerns in the long term. BGE prepared engineering service procedure No. ES199600343 to install a ½" bypass line across the upstream valve seats of MOV-651 & 652 with a manual isolation valve in the line to allow for leak rate testing. MOVs-651 & 652 have been modified on Unit 1 and will be modified on Unit 2 during the 1999 refueling outage. The inspectors reviewed the BGE operability evaluation and modification package and did not identify any concerns.

BGE had not completed evaluating the capability of all affected MOVs to overcome the predicted thrust requirements. The design calculation for valves 2-MOV-6900 & 6901 did not indicate adequate capability of the motor actuator to overcome the new pressure locking thrust requirement. BGE prepared an issue report IR3-000-425 on September 9, 1998, which provided justification for the operability of these MOVs until additional diagnostic testing could be performed during the 1999 Unit 2 refueling outage. The inspectors did not identify any concerns with the operability evaluation.

Other changes in the BGE GL 95-07 evaluations included: (1) removal of steam generator feedwater isolation valves MOV-4516 and MOV 4517 from the scope of the generic letter; (2) assumption of a 0.7 valve factor in pressure locking thrust calculations; (3) revision of the method of predicting thermally induced pressure rise in valve bonnet to be consistent with recent industry test results; and, (4) use of measured data to determine unwedging thrust.

BGE filled the emergency sump recirculation piping with water to insulate valves MOV-4144 and MOV-4145 and prevent thermally induced pressure locking of those valves. Revision of the calculations to indicate use of this method to prevent pressure locking had been initiated. BGE evaluated the potential for the valve bonnets to become pressurized from system operation or testing and demonstrated through system drawings and procedures that the valves were isolated from high pressure conditions during system operation or testing.

c. Conclusions

The inspectors concluded BGE had addressed the issues identified in IR 97-02 for evaluation of pressure locking and thermal binding of safety-related gate valves. Failure to perform timely operability evaluations for valves 2-MOV-6900 and 2-MOV-6901 constituted a corrective action violation of minor significance that was not subject to formal enforcement action.

E8.6 (Closed) Follow-up Item 50-317&318/97-02-12:Procedures for Extrapolation of MOV Test Results

The followup item was established to assure NRC review of a BGE revision to diagnostic test procedure MOV-009 regarding documentation of the extrapolation of MOV data from test conditions to design-basis conditions. During this inspection, the inspectors found that BGE had revised Calvert Cliffs Administrative Procedure EN-1-114 to provide guidance for the extrapolation of the valve factor derived from the MOV test. The inspectors noted that the BGE approach of extrapolating valve factor might be excessively conservative. BGE initiated IR3-018-779 on September 10, 1998, to re-evaluate the extrapolation criteria for MOV test data to address minimum necessary test conditions and methods used in other industry MOV programs. The inspectors considered the BGE actions to be adequate to resolve this issue. The followup item is closed.

E8.7 (Closed) Violation 50-317&318/97-06-01:Failure to Document Safety Evaluation for Ammonia Storage

The violation was cited for failure of BGE to complete a 10 CFR 50.59 evaluation for the storage of ammonia within the site protected area boundary and for failure to update the UFSAR. Following NRC identification of the issue, BGE engineers completed a safety evaluation and submitted an UFSAR update. The inspectors verified that these action were completed and that no problems were identified. The revised UFSAR pages had not been issued; however, BGE planned to issue the revised pages with the next UFSAR update. BGE actions in response to the violation were appropriate and the violation is closed.

E8.8 (Closed) Violation 50-317&318/97-06-02:Failure to Proceduralize Actions to be taken for Spill of Toxic Chemicals, Including Ammonia

The violation was cited for the failure of BGE to have procedures in place to combat the spill of hazardous chemicals within the protected area. Following NRC identification of the issue, the inspectors verified that BGE revised their Emergency Response Plan Implementing Procedure 3.0 "Immediate Actions," to ensure that hazardous material spills were treated appropriately, including determining the need for placing control room ventilation in recirculation. The inspectors also verified that training of plant operators in use or respiratory equipment was upgraded to include donning and activation of the gear on an annually. BGE actions in response to the violation were appropriate and the violation is closed.

E8.9 (Closed) LER 50-317/97-007-00, Containment Tendon Test Interval Exceeded

a. Scope (92700)

The inspectors reviewed Licensee Event Report (LER) 50-317/97-007 that described a BGE failure to complete the first three consecutive Unit 1 containment tendon surveillances within the technical specification surveillance interval. In addition to reviewing the LER, the inspectors performed an onsite inspection to verify that the long-term corrective actions specified in the LER were completed.

b. Observations and Findings

On October 29, 1997, during a self-assessment of a completed surveillance test procedure (STP) for the Unit 1 containment tendons, BGE identified that the three previous Unit 1 STPs were not completed within 3.25 times the surveillance interval, as required by technical specifications. The combined test interval for the first three consecutive Unit 1 Containment Tendon Surveillances exceeded 3.25 times the specified five year test interval. The Unit 1 containment tendon surveillance should have been completed by March 2, 1990; however, this surveillance was not completed until May 27, 1991. TS 4.0.2 was amended on January 2, 1991 and the 3.25 requirement was deleted. However, for ten months (from March 2, 1990 until January 2, 1991) the first three consecutive five year Unit 1 surveillances combined time interval was excessive. When the surveillance test was successfully completed on May 27, 1991, engineering evaluation by BGE concluded that the Unit 1 containment was operable with adequate design margin. Therefore, this event did not result in any significant safety consequences.

BGE determined that the cause of the event was excessive use of the grace period that resulted in an overall increase of the combined surveillance interval. The immediate corrective actions performed by BGE included the conduct of a complete review of all STP performance dates to ensure that STPs had been properly scheduled and completed without excessive reliance on the 25 percent grace period. Additionally, training for surveillance test coordinators was conducted to reinforce the need for self-verification when scheduling surveillance tests. The inspectors discussed the completion of these activities with BGE personnel. The inspectors also verified that completion of the training was documented on a Calvert Cliffs training record.

BGE identified long-term corrective actions that included performing a root cause investigation and revising the surveillance testing administrative procedure. The inspectors reviewed the root cause investigation report and determined that the report was detailed and thorough. The underlying causes for the event included weaknesses in management oversight, supervision, selection of workers, and the test procedure. A corrective action identified by the investigation was to revise administrative procedure EN-4-104, "Surveillance Testing," to require management approval if a significant amount of the surveillance grace period will be exceeded for those surveillances with a periodicity exceeding six months. The inspectors

confirmed that this revision was completed and also noted that the bases for this requirement revision was captured in the procedure.

The failure to meet the surveillance interval requirements of Technical Specifications (TS) 4.0.2, was a violation of NRC requirements. BGE identified the isolated event, determined the cause, and took appropriate corrective actions. The event was not willful. This non-repetitive and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy. **(NCV 50-317&318/98-09-01)**

c. Conclusions

BGE, in 1990, failed to complete the first three consecutive Unit 1 Containment Tendon Surveillances with the 3.25 times the surveillance interval required by technical specification. The underlying causes for the event included weaknesses in management oversight and the test procedure. No safety consequences resulted from this event.

IV. Plant Support

R1 Radiological Protection and Chemistry (RP&C) Controls

R1.1 General Exposure Controls

a. Scope

The inspectors selectively reviewed external and internal exposure controls and contamination controls during plant tours. The inspectors reviewed work in progress, reviewed applicable documentation, and interviewed cognizant personnel.

b. Observations and Findings

A worker involved with preparation and planning for charging pump work was verified to have signed in on the appropriate special work permit and was observed to exhibit good radiation worker skills and a questioning attitude during his work activities on September 21, 1998. Radiological surveys for the task were posted for referral, were of good quality, and were verified (by independent survey of external exposure rates) to reflect radiological conditions.

High radiation areas were posted as required and additional warning postings were provided at the approach to the areas. Those high radiation areas required to be locked were properly secured to preclude unauthorized entry. Contaminated areas were properly posted and barricaded consistent with BGE procedures.

c. Conclusions

Field observations of on-going work activities and station radiological controlled areas indicated BGE was effectively implementing its fundamental radiological controls requirements for external and internal exposure control.

R1.2 Program and Organization Changes

a. Scope

The inspector reviewed organization and staffing, programmatic changes, and equipment changes since the last inspection. Also reviewed was the BGE Radiation Protection Improvement Plan.

b. Observations and Findings

Subsequent to an April 9, 1998, Unit 2 reactor annulus event, (Reference NRC Combined Inspection No 50-317;318/98-05, dated June 2, 1998), BGE focused additional management attention and resources to the enhancement of the radiation protection program. BGE presented a summary of its assessments and findings and short and long term corrective actions taken at a June 18, 1998, meeting at NRC Region I (Reference NRC Meeting Summary dated July 8, 1998). BGE also implemented corrective actions as a result of self-identified personnel procedure adherence matters (See Section R1.3 of this report.).

These efforts included revision of the Radiation Protection Improvement Plan (RPIP), performance of radiation protection program procedure reviews by contractors, and implementation of program procedure upgrades using contractors and dedicated staff. Other initiatives included efforts to hire additional staff and fill open vacancies. BGE was drafting risk based radiological job planning procedures for planning and control of radiological work. BGE assigned a dedicated manager and team to implement the RPIP.

c. Conclusions

BGE exhibited significantly improved management attention to the radiation protection program as evidenced by the program changes and enhancements made in response to self and NRC identified problems. BGE was continuing to implement its RPIP in an effort to further improve its radiological controls program. Dedicated personnel were assigned to implement the RPIP and effect further improvements.

R1.3 Review of Hoist Box Event

a. Scope

The inspector selectively reviewed the circumstances surrounding the radiological controls problems identified by BGE during work on a Unit 2 refueling hoist box in July 1998. Also reviewed were BGE's evaluations and corrective actions dealing with the problems identified.

b. Observations and Findings

During the period July 1-18, 1998, BGE transferred the Unit 2 refueling machine hoist box from the Butler Building, and performed maintenance and testing work on the hoist box and its components. The maintenance included disassembly and decontamination of the box on the 45' elevation of the Auxiliary Building and subsequent maintenance and testing activities at two locations on the 5' elevation of the Auxiliary Building. The work activities were covered by one special work permit which was revised periodically consistent with plans and improved radiological conditions. The work was initially classified by BGE as a high risk radiological work activity due to radiological contamination and previously noted elevated radiation levels, but was subsequently downgraded to a routine task after the hoist box was decontaminated.

On July 17, 1998, a radiation protection technician identified that a HEPA ventilation system, required to be installed by the task ALARA review, and used for portions of the work, was not installed or used. The work was suspended pending installation of the HEPA ventilation system, an Issue Report was written, and a root cause analysis was initiated. BGE found that the requirement for use of the HEPA ventilation system had been deleted from the SWP after an evaluation, but the requirement to use a HEPA ventilation system during the work had not been removed from the ALARA review and the SWP referred to the ALARA review for additional instructions.

Based on the radiological conditions present, and the expected work to be performed, BGE concluded that the failure to use the HEPA ventilation system did not result in any significant radiological risks. Nevertheless, BGE's root cause analysis identified additional radiological controls problems which had occurred earlier during the work task but had not been identified. The root cause analysis identified several violations of station radiation protection procedures.

In light of recent radiological concerns that were NRC and licensee-identified, and were the subjects of previous NRC Escalated Enforcement Actions, a review of the violations, and the circumstances surrounding them, was conducted relative to enforcement guidance contained in the NRC's Enforcement Policy (NUREG-1600, Revision 1) and other enforcement guidance (e.g., NRC Enforcement Guidance Memorandum (EGM) 98-06, dated July 27, 1998). The violations listed below were reviewed.

Preparation of SWP for Work Activities

BGE's review identified that radiation safety procedure RSP 1-201, "SWP Preparation," Revision 13, specified in Section 6.3 C., that a pre-job briefing was required for any work that required engineering controls to minimize worker intake of radioactivity, per an ALARA evaluation. The ALARA evaluation for this task (98-105, Revision B, dated July 15, 1998) specified use of HEPA ventilation systems (an engineering control to minimize worker intake of radioactivity). However, contrary to this requirement, SWP 98-105, Revision 1, Task D, Pre-job briefing, was checked as N/A.

Performance of Work Without Required HEPA Ventilation System

BGE's review identified that SWP No 98-105, Revision 3, specified that additional Instructions were to be found in the ALARA Review. The ALARA review (98-105, Revision B, dated July 15, 1998) specified that a 500 CFM HEPA ventilation system was required during overhaul and surface destruction of hoist box components. However, contrary to this requirement, on July 17, 1998, workers performed milling operations on the spreader bar, a hoist box component, at the 5' Auxiliary Building Hot Shop Machine Shop and did not use any HEPA system.

Performance of Work Without Required Lapel Air Samplers

BGE's review identified two instances where lapel air samplers were not worn in accordance with procedure requirements.

In the first instance, BGE identified that on July 17, 1998, SWP No. 98-014, Revision 4, Task A, specified that a lapel air sampler was required in accordance with procedure RSP 1-101. Procedure RSP 1-101, Revision 17, specified that lapel air sampling was to be performed during use of compressed air. However, contrary to this requirement, the worker used compressed air to pressure test cylinders on the 5' Auxiliary Building (RV test booth) without a lapel air sampler.

In the second instance, BGE identified that on July 17, 1998, SWP No. 98-105, Revision 3, Task D, required the use of a lapel air sample for pressure testing cylinders in the 5' RV Test Booth. However, contrary to this requirement, the worker pressure tested a cylinder using compressed air on the 5' Auxiliary Building (RV test booth) without the required lapel air sampler.

NRC Review

Technical Specification 6.4, Procedures, (Amendment No. 216) requires in Section 6.4.1 that written procedures shall be established, implemented and maintained covering, among other matters the applicable procedures recommended in Appendix A of Regulatory Guide 1.33, Revision 2, February 1978. Regulatory Guide 1.33, Revision 2, recommends in Appendix A, Section 7 e., that radiation protection procedures be established including procedures for access control,

radiation surveys, airborne radioactivity monitoring, implementation of the ALARA program, the radiation permit system, and personnel monitoring.

The above four examples of failure to follow procedures was considered a violation of Technical Specification 6.4.

BGE initiated various corrective actions after it identified the problems on July 17, 1998, as follows:

- The work activity needing the HEPA ventilation system was stopped pending installation of the system.
- An Issue Report was generated.
- The work task was subsequently suspended (SWP No 105 task D).
- A root cause analysis was initiated and completed on September 1, 1998 (BGE RCAR 98-25).
- A BGE special team was appointed to review and rewrite all active SWPs. Routine SWP's were rewritten for clarity, uniformity, and simplicity. The number of routine SWPs were reduced from fifteen to four.
- Site wide training was conducted on the new routine SWPs for appropriate personnel.
- Special training was provide to critical and non critical radiation workers on the hoist box event and BGE expectations regarding implementation of the radiation protection program.
- A group review of all SWP/ALARA reviews was implemented for the summer 1998 forced outage.
- Whole body counts were conducted on personnel who worked without wearing the prescribed lapel air samplers. No significant intakes of airborne radioactive material was identified.
- BGE took action to retrain SWP/ALARA review preparers and qualified reviewers on the procedure requirements for preparation of SWPs.
- BGE initiated evaluations of radiation worker and radiation protection personnel understanding and compliance with requirements.

BGE had incorporated the corrective actions into its corrective action tracking process.

Prior to the identification of this matter by BGE, BGE was in the process of implementing interim and long term corrective actions, as appropriate, for violations identified during an NRC inspection conducted in April and May 1998 (Reference NRC Combined Inspection Report Nos. 50-317;318/98-05, dated June 2, 1998). The inspection reviewed radiological controls problems that occurred during Unit 2 reactor annulus work on April 9, 1998. The referenced inspection was the subject of an NRC pre-decisional enforcement conference held on June 18, 1998, and the NRC escalated enforcement action issued September 2, 1998 (EA 98-280). In addition, BGE was the subject of NRC escalated enforcement action on August 11, 1997, (EA-97-192) as a result of problems identified by the NRC during review of April 1997 diving activities at the station. BGE implemented various corrective actions for those matters.

The above violation, licensee corrective actions, and previous NRC enforcement actions were reviewed by the inspectors relative to Section VII B.4 of the NRC's Enforcement Policy. The review found that the circumstances surrounding the above violation and BGE's corrective actions met the guidance of Section VII B.4. Specifically, the violation was licensee-identified as part of the corrective action for previous enforcement action (i.e., BGE's increased level of sensitivity to radiation protection problems prompted a through review of the work). The root cause of the violation was similar in nature as the violation for which enforcement action was issued (i.e., personnel adherence to procedures and clarity of requirements). This most recent violation had limited safety significance, though the regulatory concern is similar to the previous violation. The issue would be categorized as a Severity Level IV violation. BGE took immediate and planned comprehensive long term corrective action to prevent recurrence. Based on the above, this violation is not being cited in accordance with Section VII.B.4 of the Enforcement Policy. (NCV 50-317&318/98-09-02)

c. Conclusion

BGE effectively self-identified radiation protection program and personnel performance deficiencies through its review of work performed on the Unit 2 refueling bridge hoist box. BGE suspended the affected work activity and implemented appropriate corrective actions including performance of a root cause determination. No personnel contaminations or unplanned radiological exposures occurred in the events. Although a violation of Technical Specification 6.4, relative to implementation of radiation protection program procedures was identified, BGE met the criteria specified in Section VII B.4 of the NRC Enforcement Policy for not citing the BGE identified violation.

R8 Miscellaneous RP&C Issues

- R8.1 (Closed) Follow-Up Item 50-317&318/97-06-03:UFSAR not consistent with ODCM.

This item was opened pending BGE's actions to update the UFSAR to reflect a footnote in the Offsite Dose Calculation Manual (ODCM). The footnote in Table 3.12-1 explained that certain sample locations are not "in the general area of," "close to," or "near the site boundary" for a direct radiation sample, an air sampler, and a food product location respectively. BGE updated the UFSAR. The change was appropriate. This item is closed.

- R8.2 (Closed) URI (50-317&318/96-04-03):Inconsistencies associated with processing and storage of radioactive waste relative to UFSAR descriptions

The inspector noted BGE reviewed the inconsistencies and concluded that all areas need to be included in the UFSAR since Chapter 11.4 of the UFSAR provided for storage and control of licensed material in accordance with BGE procedures. BGE updated and clarified the UFSAR, via Revision 20, to reflect current radioactive waste and radioactive material processing and storage practices. Current BGE

procedures provided for review and evaluation of storage areas including periodic surveillance of those areas. BGE also initiated evaluations for specific onsite radwaste and radioactive material storage locations not identified in the UFSAR, that did not already have such an evaluation. BGE had previously removed stored radioactive material from selected areas including a concrete storage module. BGE performed a bounding safety evaluation to demonstrate that waste and radioactive material storage areas did not present any onsite or offsite radiological concerns. BGE was completing final reviews of its safety evaluations and anticipated approval of the reviews around the end of the year. No violation was identified. This item is closed.

- R8.3 (Closed) VIO 97-192-05014: Issue reports were not provided to the issues assessment Group for corrective action

The inspector verified BGE implemented the corrective actions outlined in its September 11, 1997, response to the Notice of Violation. The corrective actions included conduct of a site-wide search to identify additional examples of misplaced issue reports and training of appropriate site personnel on the expectations regarding processing of issue reports. BGE determined that thirty issue reports were lost or misplaced but corrective actions were determined to be completed or scheduled for completion for the matters prompting the issue reports. This item is closed.

- R8.4 (Closed) VIO (EA 97-192-02014: BGE did not implement effective access control to the emergency airlock

The inspector verified BGE implemented the corrective actions outlined in its September 11, 1997, response to the Notice of Violation. The corrective actions included issuance of an issue report, completion of a root cause analysis, implementation of a new style door locking device, revision and enhancement of procedures, and training of appropriate personnel on expectations and procedures. This item is closed.

- R8.5 (Closed) VIO 97-192-01012: BGE did not effectively control access to a very high radiation area during diving operations

This item was reviewed in-part during NRC Inspection 50-317;318/98-03, March 20, 1998. The review included observation of radiological diving operations. The inspector verified BGE implemented the corrective actions outlined in its September 11, 1997, letter to the NRC for this matter. The corrective actions included establishment of enhanced management oversight for higher radiological risk activities, development of improved radiological diving procedures, and training of appropriate personnel on upgraded diving program procedures.

A review of BGE's high and very high radiation access control program indicated program procedures provided controls consistent with guidance provided in NRC Regulatory Guide 8.38, "Control of Access to High and Very High Radiation Areas in Nuclear Power Plants." The review, however, identified weaknesses in the clarity

and guidance to radiation protection personnel for radiological controls for high radiation area access control. BGE issued incident reports for these matters and placed them into its corrective action process. The violation is closed.

- R8.6 (Closed) VIO (50-317&318/97-03-01): Radiation safety personnel were issuing Gold Cards for identified concerns in lieu of incident reports

The inspector verified BGE implemented the corrective actions outlined in its July 31, 1997, response to the Notice of Violation. The corrective actions included training of radiation safety personnel on the Calvert Cliffs corrective action program; issuance, as appropriate, of issue reports for those items originally identified as needing such reports; and review of Gold Cards for additional examples. This item is closed.

- R8.7 (Closed) VIO (50-317&318/97-06-04): There were no procedures for survey and monitoring of laundered protective clothing

This matter was reviewed during NRC Inspection 50-317;318/97-07, dated January 27, 1998, relative to BGE's January 5, 1998, response to the Notice of Violation. BGE implemented the corrective actions as outlined in its letter. However, criteria for sample size of laundry was not clearly specified, including actions to be taken if isolated elevated levels of contamination on single clothing items was detected. The inspector noted BGE revised the laundry monitoring procedures to provide clear guidance for sample size and actions to be taken on elevated levels. This item is closed.

- R8.8 (Closed) VIO (50-317&318/97-06-05): Worker did not follow radiation protection procedures during reactor coolant pump work

The inspector verified BGE implemented the corrective actions outlined in its January 5, 1998, response to the Notice of Violation. The corrective actions included completion of a root cause analysis, subsequent corrective actions for identified problems, and notification of site personnel of expectations when working in high radiation areas via a December 24, 1997, Plant General Manager memorandum to BGE employees. This item is closed.

- R8.9 (Closed) VIO (50-317&318/97-06-06): Air samples were not properly collected during reactor coolant pump work

The inspector verified BGE implemented the corrective actions outlined in its January 5, 1998, response to the Notice of Violation. The corrective actions included issuance of an Issue Report, and completion of a root cause analysis report and associated corrective actions. Affected personnel were whole body counted with no significant intakes of radioactive material identified. The matter was discussed in radiation safety personnel continuing training. This item is closed.

- R8.10 (Closed) VIO (50-317&318/97-06-07): Two Radiation protection technicians did not properly wear their personnel dosimetry when entering the containment airlock

The inspector verified BGE implemented the corrective actions outlined in its January 5, 1998, response to the Notice of Violation. The corrective actions included issuance of an issue report, completion of a root cause analysis and associated corrective actions, and training of appropriate personnel. This item is closed.

- R8.11 (Closed) VIO (50-317&318/97-07-02): Radiation safety personnel did not perform surveys on the refueling bridge during activities on the bridge

The inspector verified BGE implemented the corrective actions outlined in its February 26, 1998, response to the Notice of Violation. The corrective actions included completion of a root cause analysis and associated corrective actions and training of appropriate personnel regarding activities requiring coverage by radiation protection personnel. This item is closed.

- R8.12 (Closed) IFI (50-317&318/98-01-04):Radioactive Waste Processing Weaknesses

The NRC observed weaknesses in audits of radioactive waste processing, storage, handling, and transportation including lack of coverage of topics and lack of use of audit check lists to ensure all appropriate areas were reviewed. BGE concurred with the inspector observations and initiated audit program enhancements that included use of detailed checklists and audit plans. An individual with radwaste experience was obtained by the audit organization to provide oversight of station radioactive waste activities. This item is closed.

- R8.13 (Closed) IFI (50-317&318/98-01-03):Weaknesses in generation and use of scaling factors for hard to determine radionuclides

Following inspector questioning regarding scaling factors used in radioactive waste discharges and shipments, BGE suspended shipments pending review. BGE documented the matter into its corrective action process and did not identify any immediate safety issues. BGE evaluated various waste streams and previously accomplished shipments of radioactive material and concluded that no instances of improper waste classification had occurred. BGE developed and implemented additional guidance for determination of scaling factors and expected to issue an enhanced program procedure in 1998. BGE was continuing to review previous shipments and reports to determine the need to update, as appropriate, previously submitted radioactive material disposal records. This item is closed.

- R8.14 (Closed) VIO (EA 97-192-03014):Worker did not wear dosimetry when working in the Unit 2 reactor coolant pump bay

The inspector verified BGE implemented the corrective actions outlined in its September 11, 1997, response to the Notice of Violation. BGE also implemented the actions outlined in its May 9, 1997, letter to the NRC which outlined immediate

and interim corrective actions. The corrective actions included suspension of all high radiation area work and initiation of an issue report. BGE performed a human performance evaluation system root cause analysis, developed associated corrective actions, and completed training of appropriate personnel regarding activities requiring coverage by radiation protection personnel. This item is closed.

- R8.15 (Closed) VIO (EA 97-192-04014): Radiation safety personnel did not survey and post a high radiation area during construction of scaffolding

The inspector verified BGE implemented the corrective actions outlined in its September 11, 1997, response to the Notice of Violation. BGE also implemented the actions outlined in its May 9, 1997, letter to the NRC which outlined immediate and interim corrective actions. The corrective actions included suspension of all work in the radiological controlled area, issuance of an issue report, a human performance evaluation system root cause analysis and associated corrective actions, and training of appropriate personnel regarding activities requiring coverage by radiation protection personnel. This item is closed.

S1 Conduct of Security and Safeguards Activities

S1.1 Security Program Review

a. Inspection Scope (81700)

An inspection of security and safeguards activities was done to verify BGE met commitments in the NRC-approved security plan (the Plan) and NRC regulatory requirements.

b. Observations and Findings

Alarm Stations. The inspectors observed operations of the Central Alarm Station (CAS) and the Secondary Alarm Station (SAS) and verified that the alarm stations were equipped with appropriate alarms, surveillance and communications capabilities. Interviews with the alarm station operators found them knowledgeable of their duties and responsibilities. The inspectors also verified, through observations and interviews, that the alarm stations were continuously manned, independent and diverse so that no single act could remove capability for detecting a threat and calling for assistance and the alarm stations did not contain any operational activities that could interfere with the execution of the detection, assessment and response functions.

Communications. The inspectors verified, by document reviews and discussions with alarm station operators, that the alarm stations were capable of maintaining continuous communications with each nuclear security officer (NSO) on duty, and were exercising communication methods with the local law enforcement agencies as committed to in the Plan.

PA Access Control of Personnel, Hand-Carried Packages and Material. On September 9, 1998, the inspectors observed personnel and package search activities at the personnel access portals. The inspectors determined, by observations, that positive controls were in place to ensure only authorized individuals were granted access to the PA and that all personnel and hand carried items entering the PA were properly searched. Additionally, on September 11, 1998, the inspectors observed material processing at the warehouse located outside the PA. The inspectors determined by a review of training documentation, discussions with warehouse personnel, and observation, that all packages were properly searched by trained and qualified warehouse personnel prior to being granted access into the PA.

PA Access Control of Vehicles. On September 10, 1998, the inspectors observed vehicle access control activities at the main vehicle access control entry point. The observations included security officer's verification of vehicle authorization and escort requirements, the performance of vehicle searches, and the use of the active land vehicle barrier system prior to granting PA access. The inspectors concluded that vehicles were being controlled and maintained in accordance with the Plan and applicable procedures.

c. Conclusions

BGE was conducting its security and safeguards activities in a manner that protected public health and safety and that this portion of the program, as implemented, met BGE commitments and NRC requirements.

S2 Status of Security Facilities and Equipment

S2.1 Security Equipment

a. Inspection Scope (81700)

Areas inspected were protected area assessment aids, detection aids, personnel search equipment and testing, maintenance and compensatory measures.

b. Observations and Findings

PA Assessment Aids. On September 10, 1998, the inspectors evaluated the effectiveness of the assessment aids, by observing on closed circuit television, a nuclear security officer conducting a walkdown of the protected area (PA). The assessment aids had good picture quality and excellent zone overlap. Additionally, to ensure Plan commitments are satisfied, BGE has procedures in place requiring the implementation of compensatory measures in the event the alarm station operators are unable to properly assess the cause of an alarm.

Personnel and Package Search Equipment. On September 10, 1998, the inspectors observed both the routine use and the daily performance testing of BGE personnel and package search equipment. The inspectors determined, by observations and

procedural reviews, that the search equipment performs in accordance with BGE procedures and Plan commitments.

PA Detection Aids. On September 9, 1998, the inspectors observed a nuclear security officer (NSO) conduct performance testing of the main perimeter intrusion detection system (PIDS) and the independent spent fuel storage installation (ISFSI). The combined testing of both areas consisted of 37 intrusion attempts in 26 zones. The NSO was detected in each intrusion attempt. The inspectors determined that the equipment was functional and effective and met the requirements of the Plan.

Testing, Maintenance and Compensatory Measures. The inspectors reviewed testing and maintenance records for security-related equipment for the previous six months and found that documentation was on file to demonstrate that BGE was testing and maintaining systems and equipment as committed to in the Plan. Security equipment repairs were performed by maintenance department technicians that are part of the security organization. The records indicated that the need for compensatory measures was minimal due to repairs being accomplished in a timely manner. Additionally, BGE was developing an automated tracking system for maintenance requests. The automated system would enable security to retrieve specific aspects of each work request to include work status, updating of actions taken, and initiation and closure dates. BGE stated that the new tracking system would be implemented by January 1999.

c. Conclusions

BGE security facilities and equipment were determined to be well maintained and reliable and were able to meet BGE commitments and NRC requirements.

S3 Security and Safeguards Procedures and Documentation

S3.1 Security Procedures and Logs

a. Inspection Scope (81700)

Areas inspected were security implementing procedures and security event logs.

b. Observations and Findings

Security Program Procedures. The inspectors verified that the procedures were consistent with the Plan commitments, and were properly implemented. The verification was accomplished by reviewing selected implementing procedures associated with PA access control of personnel, packages and materials, testing and maintenance of personnel search equipment and performance testing of PA detection aids.

Security Event Logs. The inspectors reviewed the Security Event Logs for the previous six months. Based on this review and discussion with security management, it was determined that BGE appropriately analyzed, tracked, resolved,

and documented safeguards events that BGE determined did not require a report to the NRC within 1 hour. Additionally, the inspectors noted, during the review of the safeguards event logs, that since the last core inspection conducted in February 1998, log entries associated with personnel errors were minimal.

c. Conclusions

Security and safeguards procedures and documentation were being properly implemented. Event Logs were being properly maintained and effectively used to analyze, track, and resolve safeguards events.

S4 Security and Safeguards Staff Knowledge and Performance

S4.1 Security Staff Knowledge

a. Inspection Scope (81700)

The security staff requisite knowledge was reviewed.

b. Observations and Findings

Security Force Requisite Knowledge. The inspectors observed a number of NSOs in the performance of their routine duties. These observations included alarm station operations, personnel, package and vehicle searches, and performance testing of the intrusion detection system. Additionally, the inspectors interviewed NSOs and, based on the responses to the inspectors, determined that the NSOs were knowledgeable of their responsibilities and duties, and could effectively carry out their assignments.

c. Conclusions

The NSOs adequately demonstrated that they had the requisite knowledge necessary to effectively implement the duties and responsibilities associated with their position.

S6 Security Organization and Administration

S6.1 Security Management Support and Effectiveness

a. Inspection Scope (81700)

The areas inspected were management support, effectiveness and staffing levels.

b. Observations and Findings

Management Support. The inspectors reviewed various program enhancements made since the last program inspection which was conducted in February 1998. These enhancements included the allocation of resources for NSOs to participate in

bench marking initiatives, the incorporation of the personnel access data system (PADS) into the access authorization program to enhance personnel processing and the allocation of resources for the development of the automated tracking system for maintenance requests. Additionally, BGE is in the process of hiring six new NSOs to maintain and increase present staffing levels.

Management Effectiveness. The inspectors reviewed the management organizational structure and reporting chain and noted that the Director, Nuclear Security position in the organizational structure provides a means for making senior management aware of programmatic needs. Senior management's positive initiatives to address programmatic concerns is evident by the programmatic improvements as noted in this report.

Staffing Levels. The inspectors verified that the total number of trained NSOs immediately available on shift met the requirements specified in the Plan.

c. Conclusions.

The level of management support was adequate to ensure effective implementation of the security program, and was evidenced by adequate staffing levels and the allocation of resources to support programmatic needs.

S7 Quality Assurance (QA) in Security and Safeguards Activities

S7.1 Audits and Corrective Actions

a. Inspection Scope (81700)

Areas inspected included audits, problem analyses, corrective actions and effectiveness of management controls in security.

b. Observations and Findings

Audits. The inspectors reviewed the 1998 combined QA audit of the fitness-for-duty (FFD) and access authorization (AA) programs, conducted January 22 - February 19, 1998, (Audit No. 98-02). The audit was found to have been conducted in accordance with the Plan and the FFD rule and was enhanced by the use of a technical specialist as a member of the audit team.

The audit report identified two issue reports (IR) in the audit portion of the FFD program. The IRs were associated with the proper use of the Chain of Custody form and the requirement for administering a for-cause test following a near miss accident. Both of the findings were closed during the audit. However, to enhance the process for requiring the administration of a for-cause test following a near miss accident, the applicable procedure is scheduled for revision by December 1998. The access authorization portion of the audit identified no IRs and no recommendations. The inspectors determined that the findings were not indicative

of programmatic weaknesses and the findings would enhance program effectiveness.

Problem Analyses. The inspectors reviewed data derived from the security department's self-assessment program. Potential weaknesses were being properly identified, tracked, and trended.

Corrective Actions. The inspectors reviewed corrective actions implemented by BGE in response to the QA audit and self-assessment program. The inspectors determined that the corrective actions were technically sound and were performed in a timely manner.

Effectiveness of Management Controls. The inspectors observed that BGE had programs in place for identifying, analyzing and resolving problems. They include the performance of annual QA audits, a departmental self-assessment program and the use of industry data such as violations of regulatory requirements identified by the NRC at other facilities, as a criterion for self-assessment.

c. Conclusions

The review of BGE's security audit program indicated that the audit was comprehensive in scope and depth, that the audit findings were reported to the appropriate level of management, and that the program was being properly administered. In addition, a review of the documentation applicable to the self-assessment program indicated that the program was being effectively implemented to identify and resolve potential weakness.

V. Management Meetings

X1 Exit Meeting Summary

During this inspection, periodic meetings were held with station management to discuss inspection observations and findings. On October 29, 1998, an exit meeting was held to summarize the conclusions of the inspection. BGE management in attendance acknowledged the findings presented.

X3 Management Meeting Summary

On September 24, 1998, Mr. John White, Chief, Radiation Safety Branch, Division of Reactor Safety, NRC Region I, met with BGE representatives to discuss their Radiation Protection Improvement Plan (RPIP). The purpose of the meeting was to gain better understanding of BGE's efforts relative to improvements in management oversight and involvement, integration of radiation protection into site processes, self-assessment, job planning, and corrective action development and implementation. The meeting included discussion of BGE plans and process to prevent potential unplanned exposures.

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, Radiation Safety
T. Sydnor, General Supervisor, Plant Engineering
D. Holm, General Supervisor, Plant Operations
T. Pritchett, Superintendent, Technical Support
M. Rigsby, Supervisor-Radiation Technical Services
L. Smialek, Radiation Protection Manager
J. Lemons, Manager, Nuclear Support Services Department
A. Edwards, Director Nuclear Security

NRC

J. White, Chief, Radiation Protection Branch, Region I

INSPECTION PROCEDURES USED

IP 61726: Surveillance Observations
IP 62707: Maintenance Observation
IP 71707: Plant Operations
IP 92700: Onsite Follow up of Written Reports of Nonroutine Events at
Power Reactor Facilities
IP 72755: Inservice Inspection - Data Review and Evaluation
IP 37551: Onsite Engineering
IP 71750: Plant Support Activities
IP 83729: Occupational Exposure
IP 92904: Follow-up - Plant Support
IP 81700: Physical Security Program for Power Reactors
IP 92903: Miscellaneous Engineering
IP 92902: Miscellaneous Maintenance

ITEMS OPENED, CLOSED, AND DISCUSSEDOpened/Closed

50-317&318/98-09-01 NCV Failure to meet the surveillance interval for containment tendon testing

50-317&318/98-09-02 NCV Station personnel did not follow radiation protection procedures

Closed

50-317&318/96-04-03 IFCI Review inconsistencies associated with processing and storage of radioactive waste and material, relative to UFSAR descriptions.

EA-97-192-05014 VIO BGE did not implement the issue report program.

EA 97-192-02014 VIO BGE did not implement effective access control to the Emergency Airlock, a high radiation area access door.

EA 97-192-01012 VIO BGE did not effectively control access to a very high radiation area during radiological diving operations in the Unit 2 spent fuel pool.

50-317&318/97-03-01 VIO Radiation safety personnel did not implement the stations issue reporting program.

50-317&318/97-06-03 IFI UFSAR not consistent with ODCM.

50-317&318/97-06-04 VIO There were no procedures for survey and monitoring of laundered protective clothing.

50-317&318/97-06-05 VIO Worker did not follow radiation protection procedures during reactor coolant pump work.

50-317&318/97-06-06 VIO Air samples were not properly collected during reactor coolant pump work.

50-317&318/97-06-07 VIO Two Radiation protection technicians did not properly wear their personnel dosimetry when entering the containment airlock.

50-317&318/97-07-02 VIO Radiation safety personnel did not perform surveys on the refueling bridge during activities on the bridge

50-317&318/98-01-04 IFI Weaknesses in radioactive waste processing

50-317&318/98-01-03 IFI Weaknesses in generation and use of scaling factors for hard to determine radionuclides

EA 97-192-03014	VIO	A worker did not wear dosimetry when working in the Unit 2 reactor coolant pump bay.
EA 97-192-04014	VIO	Radiation safety personnel did not survey and post a high radiation area during construction of scaffolding.
50-317/318/97-02-07	IFI	MOV Sizing and Switch Settings
50-317/318/97-02-08	VIO	Design Basis Capability of Block Valves
50-317/318/97-02-09	IFI	Steam Generator Feedwater Isolation Valve Design Capability
50-317/318/97-02-10	IFI	Safety Injection Pump Minimum Flow Isolation Valve
50-317/318/97-02-11	IFI	Pressure Locking and Thermal Binding
50-317/318/97-02-12	IFI	Procedures for Extrapolation of MOV Test Results
50-317/318/97-06-01	VIO	Failure to Document Safety Evaluation for Ammonia Storage
50-317/318/97-06-02	VIO	Failure to Proceduralize Actions to be Taken for Spill of Toxic Chemicals, Including Ammonia
50-317/318/97-007-00	LER	Containment Tendon Test Interval Exceeded

LIST OF ACRONYMS USED

AA	Access Authorization
ALARA	As Low As Reasonably Achievable
CAS	Central Alarm System
CEA	Control (Rod) Element Assembly
ComEd	Commonwealth Edison Company
ECCS	Emergency Core Cooling System
EEL	Escalated Enforcement Item
EGM	Enforcement Guidance Memorandum
EPRI	Electric Power Research Institute
ESP	Engineering Service Package
FFD	Fitness-For-Duty
HEPA	High Efficiency Particulate Air filter
HPSI	High Pressure Safety Injection
IFI	Inspector Followup Item
IR	Issue Report
ISFSI	Independent Spent Fuel Storage Installation
LER	Licensee Event Report
MSIV	Main Steam Isolation Valve
MOV	Motor Operated Valve
NCV	Non-Cited Violation
NSO	Nuclear Security Officer
OCDM	Offsite Dose Calculation Manual
PA	Protected Area
PADS	Personnel Access Data System
PDR	Public Document Room
PIDS	Perimeter Intrusion Detection System
PORV	Performance of Power Operated Relief Valve
PPM	Performance Prediction Methodology
QA	Quality Assurance
RPIP	Radiation Protection Improvement Plan
RSP	Radiation Safety Procedure
RWT	Refuel Water Tank
SAS	Secondary Alarm System
STP	Surveillance Test Procedure
SWP	Special Work Permit
the Plan	NRC-approved physical security plan
TRM	Technical Requirements Manual
TS	Technical Specifications
UFSAR	Updated Final Safety Analysis Report
URI	Unresolved Item
VF	Valve Factor
VIO	Violation