

INITIAL SALP REPORT  
U.S. NUCLEAR REGULATORY COMMISSION  
REGION 1  
SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE  
REPORT NOS. 50-317/90-99 AND 50-318/90-99  
BALTIMORE GAS & ELECTRIC COMPANY  
CALVERT CLIFFS NUCLEAR POWER PLANT  
ASSESSMENT PERIOD: JANUARY 1, 1990 - MARCH 31, 1991  
BOARD MEETING DATE: APRIL 9, 1991

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## 1. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) is an integrated Nuclear Regulatory Commission (NRC) staff effort to collect observations and data and to periodically evaluate licensee performance on the basis of this information. The SALP process is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. SALP is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to the licensee's management to promote quality and safety of plant operations.

An NRC SALP Board, composed of the staff members listed below, met on April 9, 1991, to review the collection of performance observations and data and to assess the licensee's performance at the Calvert Cliffs Nuclear Power Plant. This assessment was conducted in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance". A summary of the guidance and evaluation criteria is provided in Section B in the Supporting Data of this report.

This report is the NRC's assessment of the licensee's safety performance at the Calvert Cliffs Nuclear Power Plant for the period of January 1, 1990, to March 31, 1991.

The SALP Board was composed of:

### **Chairman:**

W. Hehl, Director, Division of Reactor Projects (DRP)

### **Members:**

M. Knapp, Director, Division of Radiation Safety and Safeguards (DRSS)

M. Hodges, Director, Division of Reactor Safety (DRS)

R. Capra, Director, Project Directorate I-1, Office of Nuclear Reactor Regulation (NRR)

C. Cowgill, Chief, Reactor Projects Section 1A, DRP

D. McDonald, Senior Project Manager, NRR

L. Nicholson, Senior Resident Inspector

**Others in Attendance:**

J. Linville, Chief, Projects Branch No. 1, DRP  
R. Summers, Project Engineer, DRP  
F. Lyon, Reactor Engineer, DRP  
A. Howe, Resident Inspector  
J. Durr, Chief, Engineering Branch, DRS  
A. Lohmeir, Reactor Engineer, DRS  
R. Keimig, Chief, Safeguards Section, DRSS  
C. Conklin, Emergency Response Coordinator, DRSS  
R. Albert, Physical Security Inspector, DRSS  
J. Furia, Radiation Specialist, DRSS  
J. Jang, Senior Radiation Specialist, DRSS

## II. SUMMARY OF RESULTS

### II.A Overview

At the end of the last SALP period, licensee performance was noted as improving. During the period, the licensee had made a number of management and programmatic changes to improve overall performance. The NRC noted that much of the improvement occurred late in the assessment period and a number of weaknesses remained to be corrected. The most notable of these included: lack of a centralized program for management of corrective actions; weaknesses in communications between departments; and inadequate follow through in the resolution of identified problems.

The improvement in performance noted at the end of the previous SALP period continued throughout this SALP period. The licensee's Performance Improvement Program continues to make progress toward improving overall operations and interdepartment communications. The organizational changes have also been effective in assuring good communications and in emphasizing a good safety perspective for all site activities. The corrective action program has also improved. The commitment management process appears to be working properly as well as the problem resolution process; however, the problem identification process still exhibits weaknesses at times. Toward the end of the SALP period though, a more consistent, lower threshold for problem identification was evident at the plant.

Improved performance over the previous assessment and/or an improving trend were noted in operations, radiological controls, maintenance/surveillance, engineering/technical support and safety assessment/quality verification. In the operations area, strong operator performance and effective licensed operator training were noted. Initiatives by management to improve operations were also evident. However, continued emphasis is needed on procedure upgrades, attention to detail, temporary modifications, and communications.

In the radiological controls area, significant improvement was noted in the radwaste program. Strong performance continued in the ALARA, dosimetry and chemistry control areas. In the maintenance/surveillance area improvement was noted in the management controls for both programs. Improvement in plant material condition and housekeeping was noted but continued licensee management emphasis in this area is appropriate.

Emergency preparedness performance remained consistent with the prior assessment, primarily due to two longstanding issues that are not yet fully resolved regarding training and qualifications, and event classification. Although security was still assessed as Category 1, a declining trend was noted during this assessment period due to some performance errors and examples of ineffective communications within the security organization.

In the engineering and technical support area, management initiatives were noted which strengthened the performance of the organization. Finally, in the safety assessment/qualification verification area, a heightened awareness and responsiveness to safety issues was noted, which clearly emphasized safety and quality over production needs. However, improvement could still be made in timely identification and assessment of conditions adverse to quality.

## II.B Facility Performance Analysis Summary

|    | <u>Functional Area</u>                     | <u>Rating, Trend Last Period</u>           | <u>Rating, Trend This Period</u> |
|----|--|--|----------------------------------|
| 1. | Plant Operations                           | 3 (Improving)                              | 2                                |
| 2. | Radiological Controls                      | 2  | 2 (Improving)                    |
| 3. | Maintenance/Surveillance                   | 3 (Improving)                              | 2                                |
| 4. | Emergency Preparedness                     | 2  | 2                                |
| 5. | Security                                   | 1  | 1 (Declining)                    |
| 6. | Engineering/Technical Support              | 2  | 2 (Improving)                    |
| 7. | Safety Assessment/<br>Quality Verification | 3  | 2                                |
|    | Previous Assessment Period:                | December 1, 1988 through December 31, 1989 |                                  |
|    | Present Assessment Period:                 | January 1, 1990 through March 31, 1991     |                                  |

### III. PERFORMANCE ANALYSIS

#### III.A Plant Operations

##### 1. Analysis

This area was rated Category 3 with an improving trend during the previous SALP assessment. Weaknesses were noted in managerial controls such as the procedure change process and in reviews of minor events to identify potential adverse safety implications. Weaknesses were also identified regarding procedural quality and adherence to procedures. Improvements in management expectations for procedure use were noted near the end of the period.

During the current assessment period, close management oversight of operations activities was evident. Unit 1 startups in April and October were performed in accordance with well structured and comprehensive startup plans that provided self-assessments at various milestones. The startup plans required around-the-clock Assistant General Supervisor coverage to strengthen management support during these startups. Extensive senior management presence in the control room and the plant was also observed indicating direct management involvement. Management expectations for procedure use were effectively communicated as evidenced by observations of procedure use during these startups and other operations. Conservative management decisions were made for operational issues such as a shutdown for nitrogen leaks from the safety injection tanks and the shutdown for an inspection of the Unit 1 containment sump after debris was found in the Unit 2 sump. These decisions demonstrated the commitment to a philosophy of safety and quality over production.

Operations management undertook several initiatives to reduce operational distractions. For example, the number of active technical specification action statements was reduced and control room deficiencies were prioritized for corrections with some reductions in the number of deficiencies observed. Additional senior operators were assigned to assist the shift supervisor with Unit 2 outage activities to effectively reduce his administrative burden. These actions indicate good oversight of day-to-day activities and a willingness to improve.

Overall, licensed operators performed in a cautious and controlled manner. Good performance during major evolutions was seen in the conduct of several plant startups, plant shutdowns, and the operation of Unit 1 for approximately six months without any plant trips. Operators exhibited a professional demeanor in the control room, they were knowledgeable of outage modifications, and they were familiar with operating procedures. Timely and appropriate actions were taken in response to plant events such as the inadvertent opening of a power operated relief valve while shutdown and a loss of condenser vacuum during a heatup. These attributes were indicative of overall operator competence. However, some problems in operator performance were manifested in the occurrence of events during the period. Examples include improper release of a waste gas decay tank and missed surveillance tests while a diesel generator was out of service. Also, during a two month period just before the fall startup several minor events occurred, such as the spent fuel pool overflow, which were attributable in part to inattention to

detail and inadequate control of activities. In response to these events, BG&E management conducted appropriate root cause determinations and took corrective actions. Additionally, to determine potential common causes, an independent assessment was performed of the events that occurred before the fall startup. Corrective actions such as the reduction of operator distractions and feedback on performance were generally effective and resulted in extended power operation without events. However, these efforts were not fully successful as evidenced by an inadvertent containment spray initiation and an inadvertent engineered safety features actuation that occurred near the end of the period. Management response to these events was ongoing as the period ended.

Progress was noted in procedure improvements. The procedure upgrade program was found to be well controlled by BG&E with provisions in place to produce good quality procedures. A number of previously identified discrepancies have been effectively resolved such as revised administrative procedures that strengthen the controls over procedure review, development, and changes. NRC review of operating procedures for startup and shutdown and a demonstration of the procedures on the simulator found that the procedures were adequate to support safe operation of Unit 1. Procedures were also generally effective during normal plant operations and in response to abnormal events. The emergency operating procedures were noted to be generally effective and previously identified problems were corrected. There were some instances of inadequate procedures that contributed to plant events such as the misalignment of a power source to the cooling water supply pump of an emergency diesel which made the diesel generator inoperable. These procedures had not yet gone through the procedure upgrade process. Operators had minor difficulties maintaining strict procedure compliance while using abnormal operating procedures with emergency operating procedures. BG&E has recognized these procedure problems and has adequately initiated corrective actions. Near the end of the assessment period, BG&E recognized concerns with inconsistent interpretation of administrative requirements such as "journeyman knowledge" applications and the provision allowing the performance of procedure steps in parallel. The latter was a major contributor to the containment spray event. At the end of the period, management was implementing corrective actions to address these problems.

Operations communications were generally effective. Good shift turnover, pre-shift and pre-evolution briefings were consistently observed. Interaction between operations and other plant departments improved resulting in timely resolution of problems such as saltwater biofouling. However, instances of weak communications occurred which contributed to some events such as an inadvertent reactor coolant pump start and the inadvertent containment spray initiation. In response to the communications problems, BG&E management has taken corrective actions and improvements were noted as the assessment period ended.

Operator training was effective and improved as indicated by an overall 97% pass rate for initial and requalification examinations as compared with a 69% pass rate in the previous period. Factors that contributed to this improvement include good planning and administration of requalification examinations, well prepared examination material, and better screening of initial examination candidates. Operators effectively used the Emergency Operating Procedures during

evaluations on the simulator. Operators were found to be knowledgeable of operating and abnormal procedures and outage modifications. The above factors and the successful integration of new operators into the operating shifts demonstrate the effectiveness of training.

The operating shifts were fully staffed without the excessive use of overtime. A pilot 12 hour shift rotation was started late in the period to determine its feasibility on a permanent basis.

Work controls improved during the period but some problems remain. Practices in safety tagging and the scheduling of maintenance were successful in minimizing the cumulative time safety related equipment was out of service. The temporary modification (TM) process has been strengthened to screen TMs for safety impact but implementation of some TMs was not fully successful as shown by a failure to recognize the effect of a TM on a tagging boundary and inadequate training of the operating staff on the effect of a TM associated with the reactor vessel level monitoring system. There were still some difficulties in weak problem resolution, exemplified by several fire door problems during outages.

In summary, licensed operator performance during major evolutions was a strength. BG&E management has been generally effective in communicating and demonstrating its commitment to procedure adherence and safety conscious attitudes. Operating procedures were improved but some problems remain. Management has continued actions to upgrade operator performance in response to identified problems, however the occurrence of several events demonstrates the need for continued additional management attention. Training and staffing were supportive of effective operations. Efforts to improve communications and work controls met with mixed success. Overall, performance in operations continued to improve.

## 2. Performance Rating

Rating: Category 2

### III.B. Radiological Controls

#### 1. Analysis

During the previous assessment period, the Radiological Controls program was rated Category 2, with declining performance noted in the areas of follow up on identified problems, management involvement in assuring quality and radiological training. In addition, BG&E had significant problems related to their radwaste processing and transportation program.

BG&E continued to implement an effective radiological safety program, with strengths noted in the ALARA and dosimetry areas. Radiological operations made significant gains in the decontamination of plant equipment and areas, but occasional weaknesses were identified in housekeeping in Unit 2, improper RWP sign-in and control of high radiation area entries.

BG&E continued to be an excellent performer in the ALARA area, with a challenging goal of 335 person-rem for both units in 1990 met. The ALARA program has remained strong in part due to the very low source term present at the units. The source term was maintained low through an aggressive chemistry program. Additionally, noted strengths in staffing, training and management support for the ALARA program were identified.

The dosimetry program also remained a notable strength. Quality controls for the whole body counters and TLD readers were excellent. Records were maintained as required for all personnel having access to the Radiologically Controlled Areas. An exception to this was occasional entries on improper or expired RWPs by some plant staff. Respirator usage was kept to a minimum by the licensee through the use of aggressive controls for potentially airborne contaminated areas.

Strengths in staffing levels and the training program for the health physics technicians were noted. BG&E has made significant increases in its Radiation Safety staffing levels since the last assessment period. In addition, the licensee has implemented a new training program for health physics technicians, that assigns 25% of the technicians to a full time training program.

During the assessment period, BG&E experienced several instances of improper entries into high radiation areas. Licensee analysis of the root causes for these events was extensive; however, initial corrective actions were slow being implemented. The final corrective actions were determined to be effective once implemented.

Decontamination efforts have been significantly increased with the commencement of the plant restoration project. Through extensive decontamination of rooms and general areas throughout the Auxiliary building, reductions in personnel contamination incidents (PCIs) have been noted. Plant housekeeping has been occasionally inconsistent, especially in the Unit 2 containment. During some of the inspection tours, areas were found to be well posted and controlled, however at other times, the need for improved housekeeping was noted by the plant staff and NRC.

The BG&E program for the assurance of quality in radiation safety has improved. Audits were conducted in a highly effective manner, with the scope and technical depth of these audits being excellent. Management responsiveness to audit findings and recommendations remained inconsistent, however. The BG&E surveillance program remained very limited, although near the end of the assessment period, the licensee did increase the staff available for this program area.

BG&E made significant improvements in the radwaste and transportation program. As part of its corrective actions for previously identified issues in this area, the licensee implemented the use of a computer code to significantly reduce the chances of calculational errors in shipping documents, and has implemented an aggressive waste and plant sampling program for the derivation of waste stream specific scaling factors.

The BG&E resolution of technical issues in the Radiological Controls area has improved significantly. The licensee initiated actions to address a resin intrusion into the radwaste vent header system, and to address the long-standing neutron streaming problem.

#### Radiological Environmental Monitoring and Effluent Control Programs

Review of the licensee's Radiological Environmental Monitoring Program (REMP) indicated that BG&E was conducting an excellent program. Sampling procedures and air sampling equipment were upgraded and an excellent QC program was in place to assure the quality of sample analysis. REMP related reports were an excellent reflection of BG&E's utilization of the REMP on a broad scope and in the use of the technical expertise to go well beyond the regulatory requirements in BG&E's assessments. The meteorological monitoring system was properly calibrated and maintained.

An administrative control problem had been identified relative to record keeping and reporting of effluent monitor calibration and operability, respectively. The corrective actions were properly focused. Weaknesses with the effluent monitor calibration technique were also identified, such as using two different radionuclide and radioactivity sources to determine the linearity and conversion factors, respectively. Two weaknesses in the current Offsite Dose Calculation Manual (ODCM) were identified. The setpoint calculational methodology in the ODCM used the fixed percentage distribution of radionuclides derived from the previous release data. The distribution percentages of the radionuclides in the actual effluent samples were not the same as listed in the current ODCM. The current ODCM also did not address the alarm and trip function calculations.

BG&E is pursuing the upgrade of the Radiation Monitoring Systems and the tracking of the upgrade status by the senior managers shows excellent management commitment. Air cleaning systems were well maintained and tested. A good QA audit was performed to assess the effluent control programs. The QA audit identified six (6) findings; none of safety significance. The appropriate departments responded to these findings in a timely manner. BG&E's overall performance in this area was good.

#### Confirmatory Measurements (Chemical and Radiological)

The strength of BG&E's chemical and radiological measurements QA programs was generally noteworthy. BG&E's performance in the confirmatory measurements area was good. The results of the NRC standard chemical and radiological sample measurements comparisons indicated that all the measurements (11 standard chemical and 10 radiological samples) were in agreement or qualified agreement under the criteria used for comparing results. However, the comparison results for the liquid radioactive waste samples analyzed on one detector were biased high by approximately 25%. BG&E's interlaboratory QA/QC comparison program also revealed this same apparent bias. The licensee committed to determine the cause of this bias and resolve the problem.

In summary, BG&E has continued to implement an effective radiological control program. Significant improvement in its radwaste program, in the area of resolution of technical issues, and in the areas of Quality Assurance and training have occurred. Licensee strengths continued in the areas of ALARA, dosimetry, REMP and chemistry controls. Weaknesses were identified in the radiological effluent program and, although decontamination efforts were noteworthy, some inconsistencies in housekeeping were noted.

## 2. Performance Rating

Rating: Category 2

Trend: Improving

### III.C. Maintenance/Surveillance

#### 1. Analysis

This area was rated Category 3 with an improving trend in the previous SALP assessment. Programmatic weaknesses in both the maintenance and surveillance programs had been identified and initial corrective actions were implemented as the previous assessment period ended. Initial indications were that improvement should be expected.

Overall positive performance was observed during this assessment period. Organizational changes during the previous assessment period matured and became more effective at addressing some of the longstanding programmatic problems. Although the need for program refinement remains in many areas, improvements have continued during this period.

An NRC Maintenance Team Inspection (MTI) was performed early in the period and concluded that management was supportive of improvements in the maintenance programs and had provided policy and funding to effect increased staffing, training and an overall upgrade of the program. The team noted that a significant amount of change had been initiated in the maintenance programs and that the changes appeared to enhance the program. A follow up MTI inspection and the Readiness Assessment Team Inspection conducted late in the period confirmed that program improvements were effective.

Extensive management attention to the overall maintenance backlog has decreased it by approximately 50% during this assessment period. The existence of a large maintenance backlog however, continued to challenge the maintenance department as well as the entire site organization. A comprehensive review of the outstanding work was performed prior to each

startup with an adequate threshold for identification of mode restraining work. Although a large backlog of work was still outstanding at the end of this assessment period, it was apparent that adequate controls were implemented and progress was being made at correcting this longstanding problem.

The program elements, maintenance procedure development, approval, and control, were well documented. Progress was noted in the overall upgrade of procedures. Radiological controls have been integrated very well into the maintenance process. Weaknesses were identified, however, that indicated procedural problems continue to exist. For example, a combination of a weak procedure and inattention to detail resulted in a spill of approximately 300 gallons of contaminated water in the auxiliary building. In another example, a maintenance procedure lacked sufficient detail and resulted in several safety-related service water butterfly valves being incorrectly assembled.

Cleanliness controls for maintaining systems free of debris have not been sufficiently effective. Foreign material was discovered in several safety related systems, including the containment sumps and associated piping. In another example, a plastic bottle was discovered inside the Unit 2 pressurizer. BG&E recognized this programmatic problem and implemented a program revision as the assessment period ended.

The planning and processing of work orders was observed to have improved with the implementation of a centralized work control group and increased emphasis on job planning. A Quarterly Site Scheduling process was implemented for better coordination of the maintenance effort and the early results indicated improved performance. The complement of planners was significantly increased. Formal training and guidelines were implemented. Occasional inefficiencies were observed as evidenced by the failure to coordinate work on both the fire pump driver and pump during a single outage.

Routine review of maintenance in progress indicated that the work was performed effectively and problems were addressed in a comprehensive manner. The maintenance personnel were knowledgeable and exhibited good attitudes toward their work. This is particularly noteworthy considering the relatively high amount of overtime expended over the lengthy outages. The program for contractor training and control was well documented and controlled by either a specific project manager or through inclusion of the contractor within the licensee organization.

The post-maintenance testing (PMT) program was improved to a comprehensive and well structured program. The PMT group was staffed with knowledgeable operations personnel and the program was determined to meet the objectives of the Performance Improvement Plan. Adjustments to the program implementation were necessary after a weakness was identified regarding the identification and tracking of post maintenance testing following preventive maintenance activities. In addition, the absence of well defined program responsibilities

contributed to the failure of control room operators to challenge a post maintenance test tag that was hung on the handswitch of the output breaker of an Emergency Diesel Generator that was required to be operable prior to a plant mode change. Appropriate corrective actions were implemented to correct these deficiencies.

Good management oversight and involvement was observed during several large outage projects. The work scoping, planning and repair of the Unit 2 pressurizer heater sleeves were particularly well coordinated and executed.

Improvement was noted in the surveillance test (ST) program during this assessment period. The requirements of the ST program were integrated into a central administrative procedure with a Site Surveillance Test Program Manager established to assume overall program responsibility. In the past, the ST program responsibilities were divided among several groups, resulting in varying approaches and documentation methods. Improvements were also noted in the scheduling of tests, in the coordination of large, integrated tests, and in the documentation of test results.

Although the program revisions noted above constituted a significant improvement, program deficiencies were identified regarding interface actions with post maintenance testing, promptness of completed reviews, and identification of data required to be trended. In addition, concerns were identified pertaining to the extensive use of procedure pen and ink changes and progress in upgrading test procedures. A matrix was developed to match the test procedures to the applicable Technical Specification requirements, but several tests were subsequently determined to be missing from the matrix. The above problems were indicative of a program undergoing extensive change and were identified and corrected in a timely manner.

In summary, overall performance in the maintenance and surveillance programs improved during this assessment period. Appropriate program adjustments were implemented as deficiencies and weaknesses were identified. Improvements regarding the maintenance backlog and the surveillance program appeared effective at correcting longstanding problems. The Readiness Assessment Team in February 1991 found that there were mechanisms in place, including a sufficient level of checks and balances, to reasonably assure that significant maintenance and surveillance activities are being appropriately prioritized.

## 2. Performance Rating

Rating: Category 2

### III.D. Emergency Preparedness

#### 1. Analysis

During the previous assessment period, Emergency Preparedness (EP) was rated Category 2. This rating was based upon good performance of BG&E Emergency Response Organization (ERO) members during the annual exercise, a sound training program to qualify ERO staff, and effective management involvement in the EP program. Programmatic concerns were identified with the ability to resolve quality assurance differences between EP and other staffs and performance of ERO members during walk-through scenarios. A notice of violation was issued for inadequacies of Emergency Response Plan Implementing Procedures (ERPIP). Minor concerns were identified during exercises and inspections. Other program areas such as training, incident response actions, and maintenance of program activities were performed well.

During this assessment period progress was noted in the administration of certain program areas. Performance by personnel in the 1990 partial-participation exercise was well coordinated among ERO members. Increases in the staffing of the site EP organization and upgrades in administration of the training program were implemented.

Review of routine EP program areas indicated an appropriate level of effort dedicated to maintenance of administrative functions, availability of dedicated emergency equipment and supplies, and training of ERO staff. Emergency response facilities (ERF) were maintained in a state of operational readiness and an upgrade was made in the communications system used in the Media Center for information flow to other ERFs. Other changes also received careful evaluation by the licensee and were indicative of good program effectiveness. These included revisions to public information brochures and use of the simulator during drills and exercises to provide more realistic training for operators.

During the previous period, BG&E agreed to evaluate and revise their event classification procedures to conform with guidance in NUREG-0654. During the current period, BG&E performed a detailed review and implemented a significant revision to their procedures. The NRC review of this revision revealed that significant improvements had been made. However, the NRC identified some areas where BG&E's classification procedure did not conform with the guidance of NUREG-0654. These shortcomings were further evidenced by BG&E use of the revised procedure during their 1990 annual exercise. Although event classification was performed in accordance with the revised classification procedure, it was noted by the NRC that the classification of scenario events was at a lower level than the intent of NUREG-0654 guidelines. Shortly after the end of the current SALP period, BG&E agreed to make further revisions to their classification procedure, or provide the NRC with additional technical bases for acceptance of the current classification steps as appropriate, to bring their classification procedure into agreement with NUREG-0654 guidelines.

During the 1990 annual exercise, the NRC noted strengths in command and control provided by BG&E managers. Exercise weaknesses were identified in the areas of communications and procedure adherence. Despite these findings, as well as the continued shortcoming of the classification procedure as described above, overall the NRC determined that BG&E could adequately implement their Emergency Plan and Implementing Procedures.

The EP program was satisfactorily administered by the Emergency Planning Unit Supervisor with support from EP program staff. Personnel from operations and training provided positive assistance to the program in scenario development and for training exercises. The EP Unit staffing level was sufficient throughout the period to adequately maintain program functions including maintenance of the Emergency Response Plan and ERPIPs, ensuring readiness of emergency communications and ERFs, and coordination with both onsite and offsite support groups. The EP Unit was augmented with one full time staff position which specifically enhanced offsite relations. Elimination of one organizational level between the EP Unit and senior plant staff provided for more direct involvement by management in EP activities. Both the NRC and senior BG&E managers were consistently apprised of program activities through meetings or discussions with the EP Unit Supervisor. The offsite relationship was well maintained via periodic meetings by the EP staff with State and local officials and upgrades to response facilities in Calvert and St. Mary's counties.

Training responsibilities were well defined and the ERO training program was generally effective. Management personnel and senior technical staff were assigned to ERO functional positions and an ample number of qualified personnel were available to support response activities. Course requirements necessary to satisfy each position within the ERO were well described. Training modules used for classroom and practical instruction were organized and appropriate for meeting stated objectives for designated ERO positions. However, several ERO members had not completed annual refresher training, which was a repeat finding from the previous SALP period. These positions were not key ERO positions. However, the process utilized to ensure all ERO members complete required annual training still is not fully effective.

Independent quality assurance audits of the EP program were performed using a detailed audit plan and were found to be adequate in scope and provided a thorough review of emergency preparedness activities. Audit report results were provided to plant management for acknowledgement and confirmation of audit findings. In response to previous weaknesses in resolving problems to prevent recurrence, BG&E implemented a root cause analysis program. This program was not yet complete at the end of the SALP period. However, the repeat occurrence of ERO training lapse, as discussed above, indicates that attention in this area is needed.

BG&E shift crews effectively implemented EP requirements during actual plant events. During the startup of Unit 1, two events occurred which required shutdown in accordance with technical specifications. A third incident involved an injured and potentially contaminated worker who was transported to the local hospital. Each event was properly classified as an Unusual Event

and prompt notifications were made to the ERO, State and local authorities, and the NRC. The response to each event was well coordinated with offsite support groups and strong procedure use to mitigate events was evident.

In summary, BG&E demonstrated good ability to implement the Emergency Response Plan. Emergency Response Organization personnel were usually well qualified to perform response functions. During the annual exercise performance strengths were noted, however, exercise weaknesses and improvement items were also identified. The training program was adequately defined and a good level of qualified ERO staff was maintained. Assistance to local counties resulted in notable improvements to offsite response facilities. Management attention and support for onsite program areas was generally evident but not effective in all cases since items identified in Emergency Action Level reviews and quality assurance audits have not been fully resolved.

## 2. Performance Rating

Rating: Category 2

### III.E. Security

#### 1. Analysis

During the previous assessment period, BG&E's performance at Calvert Cliffs was rated as Category 1. This rating was based on the significant enhancements that demonstrated both corporate and plant management attention to and interest in maintaining an effective, performance-based security program.

During the current period, plant security management, which consists of knowledgeable and experienced security professionals, continued to provide effective oversight of the security program. Where potential program weaknesses were identified, plant security management initiated prompt action to identify an appropriate solution and enlisted the support of corporate management to effect enhancement measures.

However, one event occurred during the period which indicated that plant security management may have been insulated from day-to-day security force activities. Security management was not aware of an incident that occurred involving a supervisor who believed he had the authority to suspend an NRC access control requirement without initiating a proper compensatory measure. Although several members of the security force were aware that the requirement was suspended, no one reported it. When the licensee became aware of this incident, a thorough investigation was conducted and appropriate corrective actions were implemented.

Corporate management continued to provide excellent financial and technical support for plant security measures. This was evidenced by significant program enhancements such as upgrading the protected area (PA) lighting, PA assessment equipment, and access search capabilities, installing a new security computer to enhance alarm station capabilities, procuring four portable guard booths, improving the on-site firearms range, and hiring consultants to conduct training and provide technical expertise in the annual security audit program.

Corporate and plant security management continued to actively interface and conduct on-site contingency and emergency exercises with law enforcement and emergency services agencies to maintain good working relationships. In addition, they continued to actively participate in groups engaged in nuclear plant security matters. Plant security management also continued to maintain a good rapport with the plant staff. Plant personnel, at all levels, exhibited respect for members of the security force and generally displayed a positive attitude toward the security program.

During this assessment period, security force staffing continued to be consistent with program needs as indicated by the minimum number of problems encountered with program implementation and the limited use of overtime. The morale of the security force remained high despite an increased attrition rate.

The licensee continued to maintain a well-developed and administered security force training program. The training staff consisted of six full-time and one part-time experienced instructors, a full-time secretary, and a supervisor. Facilities for on-site training and requalification were well-equipped and well-maintained. The effectiveness and high quality of the training program is evidenced by the licensee's security training program being accredited as a college level program by the American Council on Education. However, personnel performance appeared to have decreased somewhat during this assessment period as evidenced by four personnel errors rising to the significance of prompt-reportable events: (1) lack of control for safeguards documents, (2) inattentive security officer (3) improper access of an individual into the protected area, (4) failure to implement appropriate compensatory measures for defective equipment.

The licensee's event reporting procedures were found to be clear and consistent with the NRC's reporting requirements. Several cases of unsecured Safeguards Information were recorded as logable events and in one case (mentioned above) was reported as a prompt event. There was no indication that information was compromised in any of the cases. It appeared that all events that occurred in the period were adequately responded to by management.

The development and implementation of a Fitness-for-Duty (FFD) Program during this period, were found to be generally consistent with the spirit and intent of NRC's FFD Rule. Some minor deficiencies were identified and were or are in the process of being corrected. Adequate resources had been applied and an effective audit program was in place.

During this assessment period, the licensee submitted three revisions to the physical security plan under the provisions of 10 CFR 50.54(p). In general, these revisions were of high quality, technically sound, and reflected well-developed policies and procedures and a thorough understanding of nuclear power plant security objectives.

In summary, the licensee continued to maintain an effective, performance-based security program. The licensee also remained sensitive to the dynamics of an effective nuclear security program as indicated by program upgrades and enhancements. These were indicative of support from both corporate and plant management. However, personnel performance declined during this assessment period as evidenced by an increase in the number of personnel errors that resulted in prompt reportable events.

## 2. Performance Rating

Rating: Category 1

Trend: Declining

## 3. SALP Board Comment

The Board was concerned with the increase in personnel performance issues and the apparent insulation of security management from day to day security activities.

## II.F. Engineering/Technical Support

### 1. Analysis

This functional area was rated Category 2 in the previous SALP period. The previous SALP report identified the efforts of plant management to correct existing problems and improve engineering performance. BG&E management was responsive to these identified needs. Staff increases, added training, and procedure revisions to improve support of maintenance and operations were noted. The SALP indicated the need for an appraisal of all tasks facing the engineering effort and a prioritization of these tasks to ensure timely completion of engineering tasks related to plant safety and reliability.

During the present SALP period, management has initiated further improvements to engineering and technical support. A major reorganization of the engineering department included formation of a technical support department reporting to the Plant General Manager to allow better oversight of day-to-day engineering activities that affect plant operations. The existing nuclear engineering organization was modified to sharpen its focus on prioritizing short-term projects

requiring immediate attention, intermediate projects, and long-term projects. Engineering staff increases continued commensurate with the growing needs of the organization, including utilization of contract engineers to satisfy the immediate engineering needs of the plant improvement projects.

Several plant events led to the identification of drawing deficiencies coupled with a substantial engineering backlog. There was a delay in the initial recognition of the drawing problem by engineering; however, since the engineering department reorganization in mid-year, BG&E has implemented several projects to eliminate the growing engineering backlog and solve the drawing problem. One of these projects includes a drawing improvement program directed toward creating a hierarchy of drawings related to operations, maintenance, and design. Further, BG&E has optimized the drawing update process, improved the accuracy, and provided a computerized system which tracks the drawing update process and provides for integration of all drawing-related projects.

Training for engineering management and other engineering personnel has continued to expand. Training coordinator positions and a technical oversight committee have been established in the engineering section to ensure the implementation of required training. Examples of continued improvement included in the technical staff training programs are training in root-cause analysis and safety assessment. The design engineering sections are given specific training related to their technical responsibilities and are required to pass qualification examinations. Title 10, Code of Federal Regulations Section 50.59 training is given to all design engineers and all members of the Plant Operation and Safety Review Committee. The training program has been effective.

Good cooperation and communication have been noted between the engineering group and other organizations at shift meetings, daily report meetings, plant engineering discussions with the shift superintendent, weekly job observations, and problem identification meetings. Communications between the engineering group and the purchasing and quality assurance groups need some improvement. The combined engineering organization has taken a more active role in plant operational day-to-day activities, as evidenced through its leadership role in project engineering teams, interactions during meetings, and increased interface with maintenance and operations personnel. This has resulted in more effective communication between plant, system, and operations engineering.

The technical ability of the engineering group to respond and to provide comprehensive modification packages to solve identified plant problems has been demonstrated in several cases. A review of modification packages disclosed that the design inputs were appropriate, the engineering approaches were technically correct and complete, and the design was properly documented. Examples of these include the problems of the overload of the low-pressure, safety-injection system piping supports, repair of the pressurizer heater penetration leaks, and redesign of the safety injection tank relief valve piping and supports to eliminate vibration cracking. One area that involved substantial engineering effort that remains incomplete is the resolution of the corrosion-induced leaks and bio-fouling of the salt water system. Although, in these cases,

immediate engineering decisions were incorrect or the problems were of a complex nature requiring long-term observation and study before a final technical decision could be made, engineering's application of resources toward problem-solving was commensurate with the significance of the issue. During resolution of low temperature overpressure protection (LTOP) issues, BG&E identified errors in previous analysis. Significant resources and efforts were expended to correct the errors, to assure that similar errors did not exist in other analyses, and to improve the processes and controls to preclude recurrence.

Engineering obtained contractor assistance where specialized expertise was appropriate. Control of outside contractors in these projects had mixed success over the assessment period. For example, the oversight of the pressurizer electrical penetration project was excellent as contrasted to the oversight of the safety injection tank relief valve redesign project which resulted in a weld failure. Additionally, concern was expressed by the NRC regarding the corporate nuclear nondestructive examination (NDE) inspection unit practices, procedures, and qualification of the technicians. BG&E initiated an effort to address these concerns.

Several initiatives of engineering and technical support were noteworthy. One of these is a project to investigate plant systems that may be vulnerable to problems requiring attention. Many systems were investigated and the poorly performing systems for which an economic or safety benefit was identified were targeted for improvement capital expenditure. Another initiative was the establishment of a Life Cycle Management Program which monitors plant performance to ensure the plant operational cycles are bounded by the plant systems fatigue life capacity.

In summary, in response to the recommendations of the previous SALP report, BG&E management has taken initiatives to strengthen the performance of engineering through an organizational change and increase in staff to provide the essential framework for effective and efficient engineering. Although the many organizational and procedural changes have shown positive trend toward reducing backlog and increasing operational effectiveness, much of the program has been instituted only since mid-1990 and will take more time to become fully effective. Engineering has shown its ability to adequately handle engineering problems and modifications, and provide for several creative initiatives for future application. Weaknesses were identified in the resolution of engineering problems and in the quality of the corporate NDE support program; however, BG&E provided engineering resources which were appropriate to resolution of these problems.

## 2. Performance Rating

Rating: Category 2

Trend: Improving

### III.G. Safety Assessment/Quality Verification

#### 1. Analysis

This functional area assesses the effectiveness of BG&E's programs and management processes in assuring the safety and quality of plant operations and activities. This functional area was rated a category 3 with no trend identified during the last assessment period. It was noted that BG&E's management was ineffective in consistently incorporating safety and quality in the overall plant operation and activities during the initial portion of the assessment period. This ineffectiveness was due, in part, to an organizational philosophy which inappropriately emphasized the importance of power production. It was further noted that BG&E management clearly emphasized safety and quality as its primary goals during the later part of the assessment period.

The primary goals of safety and quality were clearly emphasized during this assessment period. BG&E management routinely assessed its decisions and directives to ensure that the message sent throughout the organization supported these goals. As a result, Unit 1 startups were delayed until evaluations had been performed on identified problems. Further, the decisions to shut down Unit 1 to correct problems with a leaking relief valve in one safety injection tank nitrogen supply line and to check for debris in the containment sump recirculation lines were examples of actions taken as a result of this management philosophy.

In October 1990, a reorganization was implemented by BG&E that elevated the position of the Plant Manager over the other department managers onsite and retitled the position Plant General Manager. The reorganization created clearer lines of authority. The system engineers and the health physics organization were joined with the chemistry organization in a new technical services division that reports directly to the Plant General Manager. This reorganization has clearly increased the Plant General Manager's ability to direct and prioritize technical resources to support improved operations.

Improvement was noted in using self-assessment techniques as demonstrated by BG&E's internal Electrical Distribution Safety System Functional Inspection (EDSSFI) and the various restart oversight activities. The EDSSFI resulted in the identification of two safety concerns with prompt corrective action taken to resolve the concerns. The Startup Review Board was seen to effectively focus the plant staff on the resolution of safety significant issues prior to Unit 1 restarts. The Independent Safety Evaluation Unit produced thorough, well-documented investigations.

A Problem Report Program was implemented to provide a mechanism for the timely identification and assessment of conditions adverse to quality. However, the criteria and expectation for problem identification were not well transmitted and understood throughout the organization as demonstrated by occasional failures to initiate problem reports. Examples of this were when paint chips were observed to be flaking into the spent fuel pool and when an auxiliary

feedwater pump was found completely covered with plastic. However, as a result of improved understanding of the reporting process and the lowered threshold for initiating problem reports, considerable improvement was observed during the later portion of the assessment period.

The onsite and offsite safety review committees, POSRC and OSSRC, respectively, continued to exhibit a good perspective relating to safety. Meetings of both committees were observed where safety issues were thoroughly discussed and probing questions were asked. The safety review committees were effective tools in assessing safety issues and supporting improved plant operation during the assessment period.

The reorganization noted above has improved the independence of the Quality Assurance (QA) organization. The reorganization relieved the QA Manager of his previous responsibilities for procurement, training, planning, administrative support, and health physics. The QA Manager is now only responsible for the QA Program. Audits performed by the QA organization were thorough and performance-oriented. The use of QA surveillance activities increased during this period and was an effective tool used to assess potential problem areas. Quality Control was changed to Quality Verification (QV) to emphasize that quality should be inherent throughout the organization. The implementation of QV inspection instructions was observed to be comprehensive and effective. The absence of these inspection instructions was a concern during the previous assessment period. However, weaknesses were observed regarding the informal tracking and trending of various performance indicators available to the QA organization. For example, programmatic deficiencies discovered during the routine review of maintenance orders were not formally identified and communicated to site management. In addition, management responsiveness and corrective actions taken as a result of QA audits in the radiological controls and emergency preparedness areas were not always effective, as noted in Section III.B and III.C of this report.

BG&E has emphasized interaction with industry to share operating experiences. Examples of its interaction include: active participation as a member of the Combustion Engineering Owners Group (G4.CEOG) which addresses generic CE design/safety issues; use of independent assessment teams to perform the effectiveness verification assessments of the implementation of BG&E's long-term Performance Improvement Plan; and utilizing industry-based experience in specifying the procurement of a comprehensive plant management computer/software system.

Licensee Event Reports (LERs) were generally well-written with clear descriptions of the subject events. The reportability determinations were appropriate; the root cause analyses were adequate; and the recommended corrective actions were technically sound.

A substantial number of licensing actions were processed by the NRC staff during this assessment period. These actions included amendment requests; exemption and relief requests; responses to generic letters and bulletins; multi-plant issues; and other regulatory initiatives. The submittals were generally acceptable, technically sound, and supported resolution of the requested actions or safety issues. Increased management involvement in assuring the quality of licensing submittals has resulted in an improved understanding of issues from a regulatory perspective.

As the result of the improved quality of the submittals; changes, clarifications, and requests for additional information were held to a minimum. In addition, there were no requests for additional time to respond to bulletins or generic letters.

Examples of significant licensing actions completed included: issuance of the second ten-year In-service Inspection (ISI) and In-service Test (IST) programs; resolution of station blackout issues; auxiliary feedwater reliability improvements; and low temperature overpressure protection (LTOP) controls. During the resolution of LTOP issues, BG&E identified errors in previous analyses. Significant resources and efforts were expended to correct the errors, assure similar errors didn't exist in other analyses, and to improve the processes and controls necessary to preclude recurrence.

The Performance Improvement Plan (PIP) represents an extensive self-improvement effort for identification of problems, determining root causes, specifying actions needed, and documenting the results. The PIP is a comprehensive plan and affects nearly every group onsite. Both the NRC and independent auditors assessed the program implementation to assure it is within the stated objectives. Although overall progress has been good, slow progress was noted on some comprehensive, multi-disciplined projects such as Issues Management, Drawing Improvement and the Procedures Upgrade Program. The project scopes were revised appropriately as the efforts matured and improvement was noted during the later portion of the assessment period. Near the end of this assessment period, BG&E integrated the remaining items of PIP into their Nuclear Program Plan.

Procedure quality has been a previous concern and was noted to have improved during this assessment period. The procedure upgrade program was found to be producing good quality procedures with adequate controls over procedure review and changes. The scope of this project was expanded beyond technical procedures to include the establishment of a nuclear procedures hierarchy that will eventually translate the Nuclear Program Policy into the various lower tiered administrative procedures. Procedure adherence was observed to be adequate, yet with occasional examples of failure to follow procedures.

In summary, a heightened awareness and responsiveness to safety issues was noted throughout this assessment period and clearly emphasized safety and quality. Good self-assessment was observed which used a variety of techniques. However, performance was mixed regarding timely identification and assessment of conditions adverse to quality.

Improvements in the onsite and offsite review committees, QA/QC, and interactions with industry were noted. The LERs continue to provide adequate root cause analysis and are technically sound. The quality of licensing actions has improved as a result of increased management attention and improved understanding of the issues from a regulatory perspective. The PIP was effective in providing overall performance improvement; however, slow progress was noted in some of the comprehensive, multi-disciplined projects.

## 2 Performance Rating:

Rating: Category 2

#### IV. SUPPORTING DATA AND SUMMARIES

##### IV.A.1 Licensee Activities

###### Unit 1

Unit 1 began the SALP period shut down to address certain management, hardware, and process deficiencies. The NRC issued Supplement 2 to Confirmation of Action Letter (CAL) 89-08 in April 1990 to permit restart of Unit 1. The unit was subsequently restarted and operated for a period of approximately two weeks before being shut down for a planned maintenance outage. The unit was taken critical on October 3 and achieved full power on October 12. On November 30, a 19 day unplanned maintenance outage was initiated to repair nitrogen leakage from the Safety Injection Tanks and add oil to a Reactor Coolant Pump. The unit operated at power until February 1, 1991 when a shutdown was initiated to inspect for debris in the containment sump. The unit returned to power operations on February 18 and remained at full power for the rest of the SALP period.

###### Unit 2

Unit 2 began the SALP period shut down for an extended refueling outage. Major activity included the repair of leaks found on the pressurizer heater sleeves. The unit remained shut down for the entire SALP period.

##### IV.A.2 Direct Inspection and Review Activities

During the assessment period, NRC inspection coverage was provided by a combination of visiting, temporary and permanently assigned inspectors. A Maintenance Team Inspection was conducted from February 5 through March 2, 1990. A special review of regulatory commitments was performed from March 5 through March 9, 1990. Augmented restart inspection was conducted during the April and October restarts of Unit 1. The annual site emergency drill was reviewed in a team inspection on August 6-10, 1990. A special inspection to assess the circumstances involving an inadvertent voiding of the shutdown Unit 2 reactor vessel was conducted on September 4-7, 1990. A team inspection to assess the readiness to restart Unit 2 was conducted on February 11-15, 1991.

##### IV.B Criteria

Licensee performance is assessed in selected functional areas, depending on whether the facility is in a construction or operational phase. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations. Special areas may be added to highlight significant observations.

The following evaluation criteria were used, as applicable, to assess each functional area:

1. Assurance of quality, including management involvement and control;
2. Approach to the identification and resolution of technical issues from a safety standpoint;
3. Enforcement history;
4. Operational events (including response to, analysis and reporting of, and corrective action for);
5. Staffing (including management);
6. Training and qualification effectiveness;

Based upon the SALP Board assessment, each functional area evaluated is classified into one of three performance categories. The definitions of these performance categories are:

Category 1: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a superior level of performance. NRC will consider reduced levels of inspection effort.

Category 2: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in a good level of performance. NRC will consider maintaining normal levels of inspection effort.

Category 3: Licensee management attention to and involvement in nuclear safety or safeguards activities resulted in an acceptable level of performance; however, because of the NRC's concern that a decrease in performance may approach or reach an unacceptable level, NRC will consider increased levels of inspection effort.

The SALP report may include an appraisal of the performance trend in a functional area for use as a predictive indicator. Licensee performance during the assessment period should be examined to determine whether a trend exists. Normally, this performance trend should only be used if both a definite trend is discernable and continuation of the trend may result in a change in performance rating.

The trend, if used, is defined as:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period and the licensee had not taken meaningful steps to address this pattern.