

ENCLOSURE 1

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE (SALP)

CALVERT CLIFFS NUCLEAR POWER PLANT - UNITS 1 & 2

REPORT NOS. 50-317/96-99 & 50-318/96-99

I. BACKGROUND

The SALP board was convened on October 31, 1996, to assess the nuclear safety performance at the Calvert Cliffs Nuclear Power Plant for the period May 14, 1995, to October 19, 1996. The board was convened pursuant to NRC Management Directive (MD) 8.6 (See NRC Administrative Notice 93-02). Board members were J. T. Wiggins, Director, Division of Reactor Safety, NRC Region I; R. V. Crlenjak, (Acting) Deputy Director, Division of Reactor Projects, NRC Region I; and S. Bajwa, (Acting) Director, Project Directorate I-1, NRC Office of Nuclear Reactor Regulation. Mr. Wiggins served as the board chairperson. The board developed this assessment for approval by the Regional Administrator.

The performance category ratings and the assessment functional areas used below are defined and described in NRC MD 8.6.

II. PERFORMANCE ANALYSIS - PLANT OPERATIONS

The plant operations area was rated Category 1 in the previous SALP period. Plant operations had maintained a superior level of performance and management demonstrated a strong safety perspective and excellent oversight of operating activities. Operators had responded in an excellent manner to challenges. Some weaknesses in the licensed operator training program were identified. Operations self-assessment activities were effective in ensuring excellent safety performance.

During this SALP period, operations continued to maintain an excellent safety focus. Operations management used self-assessment to improve performance. For example, enhancements made to the equipment operability determination program early in the period based on a self-assessment, resulted in stronger and better documented analyses supporting equipment operability determinations. Operations implemented a reactivity management program that included plant modifications, operator training, and use of a trending program to verify effectiveness. Similarly, in response to a high number of automatic plant trips in the last SALP period, site management developed and implemented a comprehensive program to reduce the number of automatic trips. Operations management also trended trip precursors such as unplanned starts or stops of essential equipment to determine causes and to take corrective actions before more significant problems developed. The results were a significant reduction in the number of automatic trips.

Operators conducted their activities in a rigorous and professional manner, with extensive use of three-way communications to ensure the proper understanding of information and orders. Operators responded effectively to plant transients, including taking prompt manual actions to stabilize the plant before automatic trip conditions were reached and by

manually initiating trips when needed. Operator response to a loss of off-site power trip was very good and included appropriately using emergency operating procedures, stabilizing the plant in natural circulation, and properly implementing the emergency response plan. Response of operations personnel to an intake system transient caused by Tropical Storm Josephine was also properly focused on reactor safety. During the SALP period, several minor valve and switch mispositionings were noted with two occurrences related to service water system maintenance.

Outage activities were well coordinated and effectively conducted. A reactor coolant pump impeller replacement included an extended period of reduced inventory that was accomplished with appropriate management oversight and very good coordination of plant activities. Outage activities were appropriately delayed when Hurricane Bertha threatened the Calvert Cliffs area. The BGE Startup Review Board reviewed the status of outage activities and appropriately ensured that training of plant personnel on outage modifications was completed. At the end of the outage, the startup was well coordinated and feedwater system operations were event free, indicating that the feedwater control system modifications implemented during the refueling outage and the training on those modifications were effective.

Weaknesses noted in the previous SALP period with licensed operator training were corrected. Initial licensing examinations were administered to well-prepared individuals and all candidates passed the examinations. However, a weakness in licensed operator attendance at requalification training was identified.

In summary, a superior level of performance was maintained in plant operations. Management demonstrated strong safety perspective and effectively used self-assessment for continued improvement. Operator performance continued to be strong and appropriately focused on reactor safety. Outage activities were well coordinated and safely conducted.

The Operations area is rated **Category 1**.

III. PERFORMANCE ANALYSIS - MAINTENANCE

The maintenance area was rated Category 2 in the previous SALP period. Improvements were made, including reductions in maintenance backlog and enhancements of the on-line maintenance process. However, personnel performance issues, which resulted in challenges to safety-related systems, had not been fully resolved. The preventive maintenance program had not been completely successful in identifying degraded components, as several plant trips were the result of component failures in balance-of-plant equipment.

During this SALP period, maintenance was characterized by appropriate management involvement with improved supervisory oversight. Maintenance programs have been successful in identifying areas of weakness and directing management attention to these areas. These efforts have been effective in both reducing maintenance related events and the non-outage maintenance backlog. The licensee has repeatedly demonstrated an excellent safety focus when problems have been identified. Examples included the

controls instituted to ensure containment integrity during fuel moves and periods of reduced reactor water inventories, and an extensive corrective action program initiated to address an early SALP period problem with foreign material exclusion (FME) noted during work on the station blackout diesel generator. Later in the period improvements to FME controls were apparent.

The trip prevention effort has been effective in eliminating automatic reactor trips and inadvertent engineered safety feature actuations. However, there were maintenance-related equipment and personnel failures that resulted in challenges to plant operations. For example, in one case poor planning and coordination of salt water system and diesel generator on-line maintenance resulted in challenging the Technical Specification allowed outage time. In another case, two ex-core nuclear instruments were miswired during replacement. Also, early in the period, a number of manual trips were the result of equipment problems. Toward the end of the period, however, maintenance performance improved and short term results indicated material condition improvements with previously problematic systems such as the feedwater system.

Maintenance sequencing and risk assessment have been very good with management demonstrating a conservative safety philosophy. The licensee effectively used risk-assessment to plan, schedule, and coordinate work for each week of the quarterly system schedule. Maintenance, operations, and engineering personnel participated in the completion of the weekly assessment worksheets. Probabalistic risk assessments were conducted on both a weekly and a daily basis and the assessments evaluated cumulative risk, the risk of troubleshooting, and the risk associated with human error. The licensee recently made enhancements to the process that included: consideration of switchyard and off-site power source maintenance; eliminating the scheduling of concurrent maintenance in two separate risk significant areas; and identifying the potential risk of maintenance to a plant trip.

A number of major maintenance evolutions were completed efficiently and correctly. This included the reactor coolant pump overhaul and steam generator inspection program, which were conducted during the most recent refueling outage. The licensee has not always ensured that contracted maintenance or off-site work groups have adhered to procedural expectations. This weakness in oversight resulted in several problems, one being significant; the loss of off-site power/reactor trip during switchyard troubleshooting. The licensee has addressed these problems by enhancing the probabalistic risk assessment and weekly assessment worksheet programs to include areas outside the plant's protected area which had traditionally been the responsibility of off-site groups.

With few exceptions surveillance performance has been good. Overall, the licensee has been effective in reducing the number of events, experienced earlier in the assessment period, caused by poor work practices involving surveillance testing. While some routine surveillance tasks have resulted in unexplained alarms, the licensee responded appropriately to these issues, identifying root causes, and taking corrective actions.

In summary, maintenance was characterized by appropriate management involvement with good supervisory oversight, and a demonstrated conservative safety philosophy. Major maintenance evolutions were completed efficiently and correctly. Throughout the SALP

period, the licensee has demonstrated improvement in reducing maintenance related events and reducing the non-outage maintenance backlog. The licensee has instituted effective programs for reducing the number of automatic reactor trips due to maintenance activities; however, additional attention is necessary to reduce manual reactor trips and transients due to equipment failures. Oversight and control of off-site workgroups was a weakness.

The Maintenance area is rated **Category 2**.

IV. PERFORMANCE ANALYSIS - ENGINEERING

The engineering area was rated Category 1 in the previous SALP period. Engineering support to the station continued to be excellent. Strong management involvement in engineering activities was evident. Engineering evaluations were consistently thorough and demonstrated good judgement, safety perspective and sound engineering principles. Excellent performance was noted in programmatic efforts such as root cause analyses, service water system improvements and steam generator inservice inspection and analyses.

This period, the licensee provided for continued strong management oversight and involvement in engineering activities that resulted in further improvements in station safety performance. For example, the licensee continued to manage the implementation of the emergency diesel generator (EDG) project successfully and continued to provide resources to upgrade plant electrical systems. However, some performance weaknesses were noted such as the licensee's poor handling of a switchgear room ventilation issue. The licensee initially focused on justifying the current conditions without verifying the technical basis for those conditions. The licensee also provided for effective communications of engineering activities and plans, in particular those associated with system engineering issues. Management focus and competent planning and scheduling work resulted in the continued decrease in the backlog of engineering activities. In addition, improvement in oversight by the quality assurance organization was noted as evidenced by the identification of a weakness in the implementation and control of modification activities during a review of the elimination of welds in the turbine-driven auxiliary feedwater pump base plate.

Engineering continued to provide strong support for the review of operating events and the resolution of emergent issues. Root cause analyses continued to be thorough, with appropriate corrective actions. For instance, the assessments for a reactor coolant pump (RCP) motor failure and an RCP suction deflector failure were excellent. Also, the analysis of the causes of the cylinder scuffing problems associated with the new EDGs was particularly noteworthy because it identified as a cause a subtle difference between French and US standards for lubricating oil chemistry. Design work was consistently of high quality as indicated, for example, by the licensee's oversight of vendor work associated with the new EDGs.

The licensee implemented engineering program and process activities generally very well. In particular, its service water/salt water system reviews were an effective means to monitor the performance of those systems. The licensee continued to develop and implement plans and strategies to deal with the narrow thermal performance margins associated with the systems' heat exchangers. When the licensee concluded that a

number of problematic indications existed in the Unit 1 steam generator tubes based on inspection results analyzed during the outage, it implemented a detailed steam generator tube degradation management strategy. The licensee continued to provide for effective system monitoring by the system engineers and the use of system report cards. Further improvements in the system engineering process were being implemented at the end of the SALP period such as the system manager concept. Noteworthy indications of the achievements of the system engineering process existed in its support of the Trip Prevention Program initiative and in its activities focused on achieving improvements in main steam isolation valve performance. The licensee also effectively used the results of its operating experience reviews. Problems that challenged maintenance and modification activities were noted in the implementation of procurement activities. In some instances, incorrect or inappropriately labeled materials were accepted by the licensee and provided to the job site for installation.

In summary, performance in the engineering area continued to be strong, with improvements noted. The licensee provided effective management control and oversight of engineering activities. System engineering and design activities continued to contribute effectively to station safety performance, including noteworthy support of the station's trip prevention efforts and of the resolution of emergent and chronic problems. The licensee continued to implement a strong and effective monitoring program for the salt/service water systems. It also implemented a strong steam generator tube degradation management program during the Unit 1 outage. A need for improvement in the procurement program was demonstrated by problems noted in the delivery to the job site of incorrect or incorrectly labeled parts.

The Engineering area is rated **Category 1**.

V. PERFORMANCE ANALYSIS - PLANT SUPPORT

The Plant Support area was rated Category 2 in the previous SALP period. Performance in radiation protection activities was good, with some room for improvement in the ALARA area. The radiological effluent and environmental programs continued to be implemented well. Emergency preparedness performance had shown improvements, but security performance had declined. Fire protection and housekeeping performance was good.

This period, radiological control activities were effectively performed. The radiation protection staff demonstrated competence in the execution of radiological controls such that radiation worker exposures were maintained as low as reasonably achievable (ALARA), and within NRC regulatory limits. Increased management attention, as demonstrated by improvements in the staffing of ALARA program functions, better work planning and control, effective exposure reduction initiatives, and enhanced performance monitoring, resulted in a much stronger ALARA program along with a notable reduction in personnel exposure during the outage. The licensee and NRC noted room for further improvement relative to oversight, control, and coordination of emergent work. The licensee continued to implement strong radioactive waste management, transportation, effluents and environmental programs.

The emergency preparedness program was effectively implemented and maintained, with some minor lapses in attention to detail. Several initiatives were established to enhance personnel training and procedure effectiveness. Performance during the September 1995

exercise was good, particularly with regard to the command and control exercised by the emergency director, and effective implementation of radiation protection activities.

Security performance continued to improve throughout the assessment period. The licensee aggressively addressed the causes for its decline in performance noted at the end of the previous SALP period. Management focus and effective oversight resulted in a quick recovery to the point where performance was again strong and effective.

The fire protection program was effectively maintained and implemented as the result of good procedures, effective control of ignition sources and flammable materials, and proper maintenance of fire fighting equipment. During the period, a number of fire watch discrepancies occurred due to a lack of individual accountability and supervisory involvement. The licensee's response to those issues was extensive and included an Independent Safety Engineering Group assessment of fire protection activities. Corrective actions have resulted in improved overall fire protection performance.

Housekeeping performance and activities were generally very good throughout the assessment period. Some issues with foreign material exclusion were effectively addressed by programmatic improvements. A reporting and monitoring system was established to track facility and cleanliness conditions in various plant areas. Radiologically contaminated areas were effectively minimized and efforts were underway to evaluate the physical and material conditions in the few spaces that are not routinely accessed due to radiological conditions.

In summary, the licensee provided excellent management attention and oversight to the plant support areas. The radiation protection area, particularly those aspects associated with the ALARA program significantly improved. The radioactive waste handling and transportation areas and the effluents and environmental monitoring areas remained strong. The emergency preparedness program was effectively implemented, with excellent performance in the 1995 exercise. Fire protection activities showed signs of needing improvement and the licensee implemented effective corrective actions to address the issues. Housekeeping, both general and radiological, was good.

The Plant Support area is rated **Category 1**.

ENCLOSURE 2

12 MONTH INSPECTION PLAN FOR CALVERT CLIFFS

IP - Inspection Procedure

TI - Temporary Instruction

CO - Core Inspection (Minimum NRC Inspection Program (mandatory all plants))

SI - Safety Issue Inspection

RI - Regional Initiative Inspection

INSPECTION	TITLE/PROGRAM AREA	INSPECTION START DATES	TYPE OF INSPECTION/COMMENTS
2515/109	MOV Testing (GL 89-10)	2/24-3/14/97	SI
IP 83750	Occupational Radiation Exposure Controls	3/17/97	CO: Unit-2 Outage (begins 3/14/97) exposure controls.
IP 84750	Radwaste Treatment & Effluents	3/31/97	CO: Environmental Monitoring
IP 84750	Radwaste Treatment & Effluents	5/5/97	CO: Effluents Monitoring
IP 83750	Occupational Radiation Exposure Controls	6/16/97	CO: Post-outage exposure controls evaluation.
IP 84750	Occupational Radiation Exposure Controls	10/20/97	CO: Routine core inspection
IP 38701	Procurement/Warehousing Activities	1st Qtr 97	RI: Follow-up to identified weaknesses in these areas.