DUANE ARNOLD ENERGY CENTER SALP 12

Report No. 50-331/95001(DRP)

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) process is used to develop the Nuclear Regulatory Commission's (NRC) conclusions regarding a licensee's safety performance. Four functional areas are assessed: Plant Operations, Maintenance, Engineering, and Plant Support. The SALP report documents the NRC's observations and insights on a licensee's performance and communicates the results to the licensee and the public. It provides a vehicle for clear communication with licensee management that focuses on plant performance relative to safety risk perspectives. The NRC utilizes SALP results when allocating NRC inspection resources at licensee facilities.

This report is the NRC's assessment of the safety performance at the Duane Arnold Energy Center for the period March 20, 1994, through October 28, 1995.

An NRC SALP Board, composed of the individuals listed below, met on November 8 and November 22, 1995, to assess performance in accordance with the guidance in NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance."

Board Chairperson

C. D. Pederson, Director, Division of Nuclear Materials Safety, RIII

Board Members

W. L. Axelson, Director, Division of Reactor Projects, RIII
G. H. Marcus, Director, Project Directorate III-3, NRR
M. A. Ring, Chief, Lead Engineer Branch, Division of Reactor Safety, RIII

II. PERFORMANCE ANALYSIS

A. Plant Operations

Performance in the plant operations functional area was excellent overall and improved throughout the assessment period. Management consistently demonstrated a strong safety focus and conservative operating philosophy. Overall conduct of plant operations was consistently effective and generally error free during routine and abnormal operations. Outage planning and scheduling were routinely executed with a strong emphasis on minimizing shutdown risk.

An excellent safety focus was routinely demonstrated in plant operations. The licensee's conservative operating philosophy was illustrated in the decision to go to cold shutdown to perform other repairs following an Electro-Hydraulic Control (EHC) leak, the decision

to shut down the plant before drywell leakage exceeded Technical Specification limits, and the planning and preparations for the refueling outage which emphasized minimizing shutdown risk. Outage activities for the two planned and three forced outages, as well as the refueling outage, were well planned, coordinated, and executed, with a proper focus on safety. The shutdown and cooldown activities for the refueling outage were well controlled and a probabilistic shutdown safety assessment was used to develop lists of required systems for various plant configurations. Shutdown risk priorities and protected systems were clearly identified in the daily outage schedule.

Management involvement in plant operations was excellent. For instance, management ensured an effective response to and appropriate assessment of two EHC leaks, three occurrences of single loop operation after a reactor recirculation pump motor generator (MG) trip, and indications of increasing drywell leakage. Senior management made frequent visits to the control room and management's standards and expectations were effectively communicated in most areas. Major testing activities during the refueling outage were well-scheduled and coordinated with the proper emphasis on shutdown risk, and were effectively monitored by management.

Efforts to identify and resolve issues were very good overall. The development of an Operations Equipment Issues List was an excellent initiative to track and resolve problems impacting operator effectiveness. Operator attentiveness in the field was good with effective and early problem identification noted in most cases. The revised corrective actions process was effectively used in most cases to identify problems and obtain resolution and received strong management support. One exception was corrective actions that were not fully effective in resolving repeated tagout and valve lineup problems. The operations self-assessments were critical and had strong management support.

Programs and procedures for plant operations were good. While some deficiencies were noted early in the assessment period with the review and approval process for procedure changes, these deficiencies were resolved, and operating procedures, overall, improved from the previous period. Operating procedures were generally clear and effective in safely achieving their purpose. Procedure usage by the operators was generally good, and identified deficiencies were routinely corrected in a timely manner. Shift turnovers were formal, well performed, and identified potential conflicts in plant activities. The temporary operations shift supervisor program continued to place shift supervisors on year-long rotations in areas such as maintenance planning and quality assurance, and resulted in strong performance in those areas. The initial and requalification training programs were very good and were successful in providing competent and well trained individuals to support plant operations.

Overall, the conduct of operations was excellent as exemplified by shutdown and startup activities associated with the refueling outage, the responses to an EHC leak and recirculation pump transients, and the

identification of a shutdown margin that was potentially less than the Technical Specification limit. Personnel errors, with the exception of tagout and valve lineup problems, were minimal during this period. Execution of control room activities, including crew communications, shift turnovers, panel attentiveness, and operator response to abnormal conditions were excellent.

The performance rating is Category 1 in this area.

B. Maintenance

Overall, performance in the maintenance functional area was good and showed improvement from the previous SALP period. Good support for the day-to-day operations of the plant was routinely observed. Excellent outage management, particularly with respect to shutdown risk and outage schedule implementation, was observed. However, in the latter portion of the assessment period weaknesses were identified in work planning and post-maintenance testing.

Management involvement in day-to-day maintenance activities was very good. Management strongly supported the Action Request (AR) process and exhibited a commitment to resolve even small issues before they adversely affected plant safety or operations. For instance, management chose to shut down the plant to repair a drywell isolation valve packing steam leak even though the leak rate was well below Technical Specification limits. Although management was involved in correcting weaknesses, such as failure to follow procedures and personnel errors identified in the previous SALP period, some minor weaknesses persisted. While the errors were of low safety significance, some involved breakdowns in self-checking or verification.

Identification and resolution of issues were good as shown in the decreasing backlog of on-line Corrective Maintenance Action Requests (CMARs) and successful resolution of identified equipment problems. Improvement from the previous assessment period was noted in reducing the number of CMARs that were over 90 days old. Generally, interactions and cooperation among the Maintenance, Operations, and Engineering Departments in maintenance related activities worked well and resulted in successful resolution of identified problems. However, in some cases resolution of issues was hampered by weak communications, such as when work on a potentially damaged motor-operated valve was not stopped and when leakage monitoring following a feed pump casing leak was not formally established with operations.

Programs and procedures for maintenance and surveillance activities were good overall. Program and procedure weaknesses identified during the previous SALP were corrected and not repeated. Outage management was excellent, especially in the areas of shutdown risk management and outage schedule implementation. The Individual Plant Examination (IPE) and Probabilistic Risk Assessment (PRA) were used effectively for scheduling the outage and on-line maintenance. The various groups involved in the maintenance and surveillance activities exhibited good

skill-of-the-craft. These attributes, combined with the Operations, Engineering, Maintenance, and Radiation Protection Departments generally working well together in implementing a 13-week rolling maintenance schedule, contributed to an effective work control process. However, in the latter part of the period, some weaknesses were noted in work planning and post-maintenance testing, such as occurred with the "A" emergency diesel generator ventilation system.

Good equipment materiel condition contributed to the good unit and safety system reliability and availability. However, some materiel condition issues arose during this assessment period, primarily with balance-of-plant equipment, that challenged the plant and personnel. Materiel condition issues resulted in one reactor scram, three instances of single-loop operation, and several plant shutdowns and down-powers. Problems with the Kaman radiation monitors and the refueling bridge identified during the previous assessment period received appropriate maintenance attention this period. However, the Kaman monitors continued to have a variety of age-related problems.

The performance rating is Category 2 in this area.

C. Engineering

Performance in the engineering functional area improved over the last SALP period and overall was excellent. Management's weaknesses in the day-by-day oversight of programs during the last SALP period became a strength during this period as illustrated by the improvements in the inservice inspection, inservice testing, motor-operated valve, erosion/corrosion, and modification programs. A more consistent questioning attitude was evident. Self assessments continued to improve with good performance-based audits leading the way, and with strong management overview of these areas. An exception to otherwise good performance involved the lack of good vendor control during the installation of a higher capacity well water pump that occurred late in the period.

An excellent safety focus and teamwork was demonstrated on emergent issues and the installation and testing of modifications in support of operational and maintenance activities. Excellent support for planned on-line maintenance and modification activities was also provided by performing day-by-day PRA analyses. These PRA evaluations were more conservative than industry guidelines and often resulted in scheduling changes even though the risks were well within industry guidelines. Also, as a result of PRA analyses in addition to the IPE, the potential for Control Building flooding was identified and prompt corrective actions were taken.

The quality of work during this assessment period was excellent. Design changes, modifications, and engineering evaluations were comprehensive and accurate with an emphasis on safety. Implementation of the modification program was considered excellent with complete and well documented modification packages, few installation problems, and

appropriate utilization of the temporary modification process. The quality of procedures improved significantly due to changes in the procedure development group and process that corrected timeliness, backlog, and quality weaknesses. Day-to-day performance, such as resolving materiel condition problems, making operability determinations, and supporting testing, was consistently good. Engineers aggressively pursued resolution of the water intrusion identified in the standby gas treatment system and the identification of low setpoints on all emergency bus degraded voltage relays.

Some longstanding equipment problems, such as the feedwater regulating valves, control rod drive high temperatures, and oil leakage on a standby diesel generator, were not initially receiving sufficient attention. Later in the period, more aggressive actions were noted. Management's prioritization of ARs and the assignment of highly skilled personnel to resolve AR root cause issues helped in the achievement of the higher level of performance.

The performance rating is Category 1 in this area.

D. Plant Support

The overall performance in the plant support functional area was excellent. Management provided strong support toward improving and maintaining the excellent Radiation Protection (RP), Emergency Preparedness (EP), Chemistry, and Security programs. Audits were very thorough in the areas of RP, Chemistry, and EP. The Fire Protection program maintained its effectiveness.

The RP program continued to receive strong management support as evidenced by further reduction in site personnel exposures, performance of a chemical decontamination of the recirculation system, and the initiation of zinc injection into the primary system. Excellent implementation of RP program changes prior to the outage and good organization and interdepartmental exchanges of information during the outage were noted. The As Low As Reasonably Achievable (ALARA) and Solid Radioactive Waste Volume Reduction programs continued to be station strengths. Considerable improvement was noted with respect to more conservative approaches to formal problem identification and interdepartmental involvement in outage planning.

Chemistry management combined strong technical competence with effective control of laboratory operations. Laboratory analytical performance was excellent as evidenced by results of both interlaboratory comparison programs and the NRC Radiochemistry Comparison program. The Hydrogen Water Chemistry program and very good water quality were strengths and contributed to minimizing intergranular stress corrosion cracking (IGSCC). The Radiological Environmental Monitoring program was effective. Self assessment and audits were performance based and also effective.

Overall, the EP program was excellent. Strengths included the overall operational status of the program, facility maintenance, the annual audit of the EP program, the experienced staff, and the overall management support. Performance during the 1994 and 1995 exercises was excellent.

Security program performance was excellent. Program strengths were identified in the areas of management oversight, equipment performance and reliability, maintenance support, and security drill/tactical program activities. Isolated personnel errors in properly implementing the search program, vital area logging activities, and protected area barrier control were evident. The errors, which were self identified and not significant, resulted from a lack of individual attention to detail. Prompt corrective measures were implemented for each finding.

The performance rating is Category 1 in this area.