Quad Cities SALP 12

Report No. 50-254/95001; 50-265/95001

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 Quad Cities Nuclear Power Station for the period December 26, 1993, through July 22, 1995.

An NRC SALP Board, composed of the individuals listed below, met on August 7, 1995, to assess performance in accordance with the guidance in NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance."

Board Chairperson
W. L. Axelson, Director, Division of Reactor Projects, Region III

Board Members
J. L. Caldwell, Deputy Director, Division of Radiation Safety and Safeguards, Region III
R. A. Capra, Director, Project Directorate, III-2, NRR
J. A. Grobe, Acting Deputy Director, Division of Reactor Safety, Region III

II. PERFORMANCE ANALYSIS

A. Plant Operations

Performance improved during the assessment period and was considered good. Senior management took conservative actions to address performance weaknesses during a dual unit shutdown in October 1994. By the end of the assessment period, the new management team clearly communicated improved performance expectations to the staff. In addition, increased involvement by first line supervision in enforcing the standards was observed, particularly in day-to-day conduct of control room operations. While several operational events demonstrated a need for continued management attention, the response by senior management was prompt, comprehensive, and effective.

During the dual unit shutdown, training was provided to operators on improved standards for conducting plant operations. The training focused on self-check, verbatim procedural adherence, and communications. However, these improved standards were not consistently enforced throughout the entire operations organization nor embraced by operators at all levels. The lack of uniform implementation of the standards contributed to events such as a loss

of off-site power to a shutdown unit and a reactor water cleanup resin tank overflow. At the end of the assessment period, significant efforts were made to coach operators on expectations and to enforce compliance with those expectations. Improved performance was demonstrated by fewer significant events and better on-line performance. Efforts to improve control room communications and panel monitoring were successful in building a more formal and attentive control room environment and have led to earlier identification of problems.

Failure to follow procedures was a problem early in the assessment period. Poor procedure quality, long delays in implementing procedure changes, and low expectations for procedural adherence contributed to the problem. During and after the 1994 dual unit shutdown, management initiated positive steps to improve procedure quality and reduce the procedure change backlog.

Performance of operators in implementing the station's out-of-service (OOS) tagging program was poor during a large part of the assessment period. Problems with configuration control of plant equipment were also observed throughout the assessment period. Extending the outage time for an emergency diesel generator and the improper draining of water from the reactor vessel were examples of configuration control problems. Weaknesses included a general lack of experience of the operations tagging group, instances of poor training, some examples of poor work package quality, and a lack of fully effective supervisory oversight. The new management team's response to continuing OOS problems by stopping work at the beginning of the Unit 2 refueling outage clearly demonstrated a strong commitment to improve performance in this area.

The ability of the operations department to identify and resolve problems was mixed. Increased use of problem identification forms and work requests indicated a low threshold for reporting problems. Although these improvements in the integrated reporting system enhanced the process, the gains were offset by weak trending, lack of rigor in some investigations, and ineffective corrective actions. Some improvements in trending were observed at the end of the assessment period.

The Plant Operations area was rated Category 2.

B. Maintenance

Overall, performance continued to be adequate. Significant improvement was noted in the latter half of the assessment period in safety focus and management involvement. Management response to specific plant problems such as foreign material control and high vibrations in rotating equipment was good. However, continued weaknesses in work control and personnel performance and some lingering material condition issues still exist.

Safety focus and management involvement improved significantly in the latter half of the assessment period. This was demonstrated by management's decision in October 1994 to maintain both units in an extended shutdown while focusing on improvements. These included the identification and correction of a high number of operator workarounds, better procedural quality and adherence, and

the evaluation of work requests that had not been tested. Program areas developed to improve plant safety and reliability, included work management, material condition, and outage preparations. Improvements were also observed in management expectations and standards, accountability, and the use of probabilistic risk assessment in work planning and on-line maintenance.

Management was effective in improving foreign material exclusion control following significant problems during the first part of the assessment period. Good management response and involvement were also demonstrated during the implementation of several worker stand-downs resulting from personnel errors, work control issues, and poor radiation work practices. At times, first line supervision was less than effective in implementing management's expectations and providing the necessary supervisory oversight. Examples included supervision of scram solenoid pilot valve and control rod drive maintenance.

Problem identification was generally satisfactory, and improvements were noted in the use of predictive maintenance techniques. Some weaknesses were identified in the use of the problem identification system and in the effective use of trending data. Good problem resolution was demonstrated on a variety of complex issues such as repairs to the Unit 2 reserve auxiliary transformer and the shared emergency diesel generator cooling water pump's bedplate. However, poor performance in equipment trending and monitoring, review of test results, and review of industry information delayed the resolution of issues such as replacement of scram solenoid pilot valve diaphragms. Response to some long-standing equipment and material condition issues was slow in the first part of the assessment period. Examples included control rod drive pumps, turbine and reactor building ventilation systems, service water system radiation monitors, 250-volt battery chargers, and recirculation motor-generator set speed control circuitry.

Programs and procedures for the conduct of maintenance and the control of work activities were complex and hindered the ability to make substantial reductions in equipment deficiencies. In addition, weaknesses in the performance and skill level of some craft personnel led to slow progress in reducing the corrective maintenance backlog. At the end of the assessment period, positive steps were taken to improve the work control process including making work control a major focus area in the 1995 Management Plan.

Throughout the SALP period, equipment failures continued to challenge plant operators, contributed to forced outages, and reduced safety system reliability. As a result, significant resources have been devoted to improving material condition. Major progress was made in reducing vibrations in rotating safety related equipment, and a focused effort was made to identify and improve the performance of systems that have historically challenged plant safety and reliability. For example, during the recent Unit 2 refueling outage, system upgrades were made to the control rod drive, feedwater control, electro-hydraulic control, and recirculation systems.

Significant performance weaknesses were also observed in the quality of work. Some maintenance tasks were performed well; however, personnel errors, coupled with poor work practices and insufficient supervisory oversight, led to plant

events, inadequate or improper maintenance activities, increased equipment outage times, and unnecessary rework. Weaknesses in interdepartmental communication and poor coordination in the implementation of the OOS program also contributed to configuration control problems, plant events, work delays, and redirection of work crew activities.

The Maintenance area was rated Category 3.

C. Engineering

Overall, performance improved during the assessment period and was good. A strong engineering management team with a commitment to sustain long term improvement was formed in 1995. Positive trends in management oversight were exhibited late in the assessment period, including the restructuring of the engineering organization to clarify engineering roles and responsibilities and establishing clear expectations of quality. While the downward trends in engineering performance have been arrested, some weaknesses still exist in system engineering effectiveness, plant system and equipment material condition, engineering work quality, and self-assessment effectiveness.

Toward the end of the assessment period, organizational changes were implemented to further improve engineering performance. The system engineering group was reorganized to focus ownership and accountability on plant systems. Ancillary assignments that distracted from the system engineers' primary focus were removed. Design engineering's role was realigned to focus primarily on the design aspect of problem resolution. The component engineering group was formed to concentrate on resolution of specific problems to support and augment system engineering.

The quality of work and focus of system engineering were very weak early in the assessment period, but have improved. Work performed on the Unit 2 hydraulic control units, high pressure coolant injection, feedwater control, electro-hydraulic control, and the residual heat removal systems, to resolve longstanding material condition deficiencies, demonstrated enhanced quality and focus. In addition, system engineering's efforts during the extensive refueling and forced outage work on Unit 1 resulted in positive material condition performance trends. Weak system design knowledge was exhibited during the scram solenoid pilot valve diaphragm reviews, industry information assessments, and walkdowns of various plant systems, such as standby liquid control and high pressure coolant injection.

Efforts to improve work quality, reduce design related workarounds, improve outage support, and provide better management of the engineering backlog have been adequate. The engineering design staff was increased to reduce dependency on outside design contractors. The effort put forth during the core shroud modification exhibited engineering's ownership when interference problems developed. However, some engineering evaluations and calculations were not always thorough or accurate. Failure to identify the shroud interference was an example of poor design review and verification.

Early in the assessment period, engineering exhibited weak field performance with minimal support to operations and maintenance. However, some

improvements in engineering field performance were noted following management initiatives. Starting with the dual unit outage in the fall of 1994, efforts were initiated to train engineers on problem identification through plant walkdowns and other review techniques. The engineering organization was sometimes ineffective in the identification and resolution of material condition problems.

Self-assessment effectiveness, including internal engineering audits, independent safety engineering group work, and quality assurance department audits, showed improved performance. The site quality verification organization showed positive changes with respect to planning and scope of performance based audits. The independent safety engineering group was utilized more effectively at the end of the assessment period with good results.

The Engineering area was rated Category 2.

D. Plant Support

Overall, performance was good. Radiation protection performance improved late in the period due to increased management attention. The performance of the chemistry, radiological environmental monitoring, emergency preparedness, and security programs was good. Performance in the fire protection program area was adequate with weaknesses noted in emergency lighting, impairment backlog, and assessment.

Radiation protection performance improved near the end of the assessment period with notable improvements in the reduction of radiological source term, contaminated areas, and TEDE-ALARA planning and execution. Although the 1994 station dose remained high, increased management attention during the Unit 2 refueling outage resulted in a decline in anticipated outage dose. Throughout the assessment period, problems with material condition and equipment reliability continued to contribute to high station dose. Poor radiation worker practices continued with weaknesses in communication of management expectations and control of contractors. Problems with contaminated material control were identified late in the assessment period.

Performance in the chemistry and radiological environmental monitoring programs (REMP) was generally good. Although plant water chemistry continued to be good, some problems were noted with the availability of the hydrogen injection system. This adversely affected corrosion control and potentially increased the radiological source term. However, more consistent operation of the injection system was noted late in the assessment period. Problems were also noted with maintenance of chemistry sampling equipment and completion of system modifications, which resulted in additional compensatory analyses by the chemistry staff. Chemistry's analytical ability and quality control continued to be excellent, and assessments by site quality verification were comprehensive and identified technically based performance issues. Oversight and administration of the REMP continued to improve.

Performance in the emergency preparedness (EP) program was excellent and continued to show improving trends. Recent management changes increased

attention and support to the program. The EP coordinators had extensive experience, which provided a strong base to the program. Emergency preparedness training improved and provided more performance based training. The "Emergency Preparedness Peer Review," provided insightful recommendations to the station EP program and was an excellent self-assessment.

Security program performance was good. Program strengths were evident in the areas of day-to-day security implementation activities, barrier control, and surveillance equipment performance. Some performance weaknesses were noted in supervisory overview and implementation of fitness-for-duty activities, protection of sensitive information, personnel and badge control, and vehicle search activities.

Performance in the fire protection (FP) program was adequate. Program strengths were fire prevention, which included control of transient combustibles, and the experience level and knowledge of the FP staff. However, weaknesses were noted in the increased number of minor fires from aging electrical equipment, the lack of timely corrective actions to repair emergency lighting, the large backlog of FP impairments, and the weak assessments of fire brigade performance.

The Plant Support area was rated Category 2.