Quad Cities Station - SALP 13
(Report Nos. 50-254;265/96001)

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 Station for the period from July 23, 1995, through October 26, 1996.

An NRC SALP Board, composed of the individuals listed below, met on October 30, 1996, to assess performance in accordance with the guidance in NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance."

Board Chairperson

J. L. Caldwell, Acting Director, Division of Reactor Projects, Region III

Board Members

R. A. Capra, Director, Project Directorate III-2, NRR
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II. PERFORMANCE ANALYSIS

Plant Operations

Overall operations performance remained good this period and major plant evolutions were conducted in a careful manner. Improvements noted since the last assessment included better implementation of performance standards by both licensed and non-licensed operators, improved procedural adherence, better implementation of out-of-service (OOS) tagouts, and improved trending and investigation of operations performance problems. However, some personnel errors and out-of-service (OOS) tagging problems still occurred, and some examples indicating a weak understanding and application of Technical Specifications (TS) and design information were identified. A few examples of operator knowledge deficiencies and procedure problems were also identified.

Continued implementation of station performance standards resulted in improved performance of routine activities, especially in control room panel monitoring and communications. Major plant evolutions such as core reload and plant

startups were conducted in a careful manner without significant operator performance problems. Operations assessment of damage, declaration of an Alert, and initiation of a Unit 2 shutdown in response to the May 10, 1996, severe storm was good.

The persistent reenforcement of management expectations and standards coupled with good oversight resulted in a decrease in the number and significance of errors; however, some personnel errors and OOS tagging problems were noted throughout the period. Inattention to detail during operator rounds and subsequent reviews resulted in a standby diesel generator and the control room ventilation system remaining inoperable for longer periods than necessary. Poor OOS preparation caused a 125 volt battery to fail and become inoperable and caused the shared standby diesel generator to be inoperable to one unit. Recent problems with verification of OOS valve positions demonstrated a lack of sensitivity to management expectations and lack of attention to detail by operators to the OOS process.

Prioritization and control of risk significant activities improved from the last period. An example of good performance included the use of a computer program in the control room to assess risk of inoperable equipment. Weak performance was seen in some cases such as the low priority given Unit 1 standby diesel generator work during the Q1R14 refueling outage.

The process for Operations to prioritize the repair of important plant equipment improved over the assessment period and resulted in a noticeable decrease in the number of open control room corrective maintenance items. However, a large number of operator work-around issues, temporary alterations, caution cards, and alarming annunciators still exist. Repeat balance of plant issues challenged plant operations. For example, problems with the turbine control and combined intermediate valves, feedwater pumps, and feedwater heater level control valves resulted in significant power reductions or taking the units off-line.

Operator understanding and application of TS and design information was a weakness evident this period which was not specifically noted in the previous period. In one case operators inappropriately entered TS 3.0.A voluntarily for leak rate testing at power in order to reduce outage time. In another instance, operators made changes to a control rod drive test procedure which changed the intent of the procedure without the proper procedure review required by TS. Some additional knowledge deficiencies were noted such as a reactor trip when the turbine bypass valves opened unexpectedly. Corrective actions to improve procedures have resulted in a number of procedure changes and some improvements in overall quality.

The self assessment and root cause programs have generally improved. Operations established a low threshold for reporting problems and improved the trending and assessment of performance. Dedicated root cause evaluators assessed trends found in operators' performance and initiated corrective actions as needed.

The Plant Operations area is rated category 2.

Maintenance

Overall performance in the maintenance area resulted in an acceptable level of safety. Significant improvements were made in material condition and a major effort was focused on improving the work control processes. Nevertheless, throughout the assessment period overall plant performance was challenged with continuing problems stemming from weaknesses in material condition, work control, supervisory oversight, and the quality of maintenance activities. These same areas were noted weaknesses in the last assessment period.

The work control process was a major focus area in the station's Management Plan. Several iterations were made over the assessment period to develop the work control process. This effort included a maintenance standdown during October and November of 1995 to overhaul the process. Many work control process changes were implemented including the electronic work control system to track and control work issues, implementation of the 13-week rolling schedule, and the formation of the Fix-it-Now and interdisciplinary work teams to more efficiently complete plant work. However, the work control process remained cumbersome with problems evident in the ability to plan, schedule, and execute work and to meet the station's backlog reduction goals. In addition, some weaknesses were evident in the quality of work packages, the use of the problem identification system, and implementation of the OOS program in support of maintenance.

Programs for the conduct of surveillance testing and inservice testing of pumps and valves were adequate. However, some programmatic weaknesses in preventive maintenance at the station were observed as indicated by recurring refueling bridge repairs, control room emergency ventilation (CREV) system failures, broken reactor building blowout panel bolts, and zebra mussel growth at the inlet to the diesel-driven fire water pumps.

Supervisory development and training were emphasized during 1996 to strengthen performance and accountability. While good supervisory oversight was observed in some activities, inadequate supervisory involvement and oversight contributed to problems experienced during several other maintenance activities, such as electro-hydraulic control (EHC) system adjustments, residual heat removal service water (RHRSW) impeller maintenance, and overhaul of the shared standby diesel generator.

While several complex maintenance activities were performed well, such as the recent Q1R14 feedwater regulating valve repair, significant problems were still evident in the quality of maintenance work. Weaknesses were identified in training, procedures, and work practices. This lack of quality resulted in plant events, increased safety equipment outage time, and unnecessary rework.

Although increased emphasis was placed on training to improve craft skill levels and work analyst performance, training weaknesses led to rework on the air header compression fittings for the control rod drive hydraulic control units and the failure of a standby liquid control system squib valve to operate during surveillance testing.

Problems associated with work practices and procedures included misalignment of the reactor pressure vessel head, reassembly of a standby diesel generator room cooler in a degraded condition, and removal of the wrong source range monitor reactor protective system shorting links. These same problems also led to rework on the EHC system and ventilation system fans; miswiring of a drywell fan cooler and a low pressure coolant injection (LPCI) valve breaker; and wrong component work on an intermediate range monitor and standby diesel generator cooling water pump.

Although weaknesses in self assessment activities such as an ineffective work week critique report and the lack of a formal self assessment process within the Material Controls Division were noted, some positive initiatives were started. These initiatives included improved tracking and trending of (1) work control and maintenance activities and (2) management or supervisory observations and critiques of work activities. Significant performance improvement from these initiatives has yet to be demonstrated.

The Maintenance area is rated Category 3.

Engineering

Engineering performance was adequate and some improvements were noted from the previous assessment period, particularly during the last few months. However, improvement initiatives started at the end of the last assessment period were not successful in assuring consistently good engineering performance. The significant exceptions included poor corrective actions for identified structural steel deficiencies and poor engineering assessment of the severe storm structural damage impact on plant design. These exceptions demonstrated that continued management attention is warranted.

Increased engineering involvement contributed to numerous material condition improvements during this period. Some of the more significant included upgrading the control rod drive, feedwater control, EHC, and reactor recirculation systems. In addition, some older engineering design issues were resolved in the latter part of the assessment period such as cable ampacity and degraded voltage issues. Engineering provided support in correcting a number of operator work-arounds and control room deficiencies. However, plant material condition issues requiring engineering resolution remained a challenge to operators throughout the assessment period. Equipment performance for some important plant systems, such as high pressure coolant injection (HPCI), RHRSW, and the CREV system remained poor. Equipment failures also led to several forced shutdowns and plant transients.

Problem identification improved as evidenced by a number of safety system deficiencies and deviations from the updated final safety analysis report found by engineering during this period. Items that were identified and corrected included improperly canceled or unimplemented modifications to gallery steel and HPCI pump nozzle supports; non-safety related power supplies to the control room ventilation toxic gas analyzer and chiller crankcase heater; and a single failure susceptibility in the reactor protection logic for the scram discharge volume level instrumentation.

Poor quality root cause evaluations and corrective actions were evident on several occasions. Inadequate corrective action for deficient structural supports in the LPCI corner rooms resulted in escalated enforcement action. Narrow root cause evaluations contributed to repeated failures of the high pressure coolant injection system and the Unit 2 standby diesel generator. Engineering was slow to evaluate leakage test data from a residual heat removal service water vault, and failed to identify and correct the root cause of the loss of audible alarms in the control room until multiple failures occurred. Engineering was also not fully successful in correcting longstanding problems with reactor building closed cooling water system temperature control valves and reactor recirculation motor-generator set speed control circuitry.

Some engineering evaluations demonstrated a weak understanding of the plant design and design bases. The poor safety evaluation of missing reactor building siding following the May 10, 1996, severe storm event would have allowed plant restart with conditions outside the design basis had the NRC not intervened. Poor understanding of design and design bases also contributed to an inadequate initial submittal addressing a potential reactor water cleanup system line break outside the drywell and an evaluation which incorrectly concluded that the high pressure coolant injection system was operable with associated vacuum breaker valves closed.

Self assessments performed by site quality verification and the independent safety engineering group were performance based and identified good issues. Use of auditors from other licensees was considered a good practice. Choosing not to implement an engineering department self assessment program as planned since 1994, and choosing to postpone a safety system functional inspection scheduled for 1996 were missed opportunities to identify additional design and engineering program weaknesses.

The Engineering area is rated Category 3.

<u>Plant Support</u>

Overall performance in the area of plant support was good; however, challenges remain in all areas. Radiation protection and chemistry performance exhibited continued improvement in ALARA planning, good plant water chemistry and increased availability of hydrogen water chemistry; however, station dose remained high. Security program performance was good, but some decline was noted in procedural adherence. The emergency preparedness program was good; however, there were some problems with the Alert declaration on May 10, 1996, and with the 1996 exercise. Fire protection performance remained adequate with some weaknesses noted with the maintenance and operability of the fire pumps.

Radiation protection performance was good, but continued to be challenged by emergent and long-standing engineering issues and a cumbersome station work control process. Although total station dose was high, there was improvement in ALARA planning and source term reduction initiatives which resulted in a reasonable dose expenditure for the work accomplished. Improvements in the control of radioactive materials was noted as the number of items identified

outside of the radiologically protected area significantly declined. However, numerous minor radworker performance problems continued to be observed largely due to an increased number of on-site contractors and poor oversight of contractor personnel. For example, inadequate oversight of the radiological waste vendor contributed to a resin spill in the radiological waste truck bay.

The chemistry and radiological environmental monitoring programs were good, with excellent staff analytical (radiochemical and chemical) performance and several station improvements to maintain good water quality and keep radioactivity in effluent releases low. Previous problems associated with completion of system modifications and cycling of hydrogen water chemistry were resolved, but maintenance of some chemistry sampling equipment continued to be a concern.

Security program performance was good, but some decline was noted regarding procedural adherence. This resulted in problems with implementing the vehicle control and psychological testing programs. A contributing factor was weak management oversight of personnel performance. However, the overall security program was fundamentally sound. The licensee effectively implemented a tactical response drill program.

Overall, the emergency preparedness program was good. Emergency response facilities were maintained with recent facility and equipment enhancements made. The licensee successfully performed the 1996 biennial exercise; however, there were some minor problems related to classification of the Unusual Event, slow initial NRC notifications, and slow correction of simulator problems. Overall performance during the Alert declaration on May 10, 1996, was good. However, minimum staffing of the interim corporate emergency operations facility was not achieved in a timely manner.

Fire protection program performance was adequate. Fire protection vulnerabilities existed due to inadequate corrective action which led to problems such as low suction pressure for the fire pumps, and inadequate preventive maintenance which led to challenges such as a zebra mussel infestation degrading fire system performance. In addition, there were continued problems with fire protection equipment failing to meet flow requirements which necessitated compensatory measures. The fire protection improvement program identified deficiencies in combustible loadings in certain safety related rooms.

The Plant Support area is rated Category 2.