QUAD CITIES SALP 11

REPORT NOS. 50-254/94001; 50-265/94001

I. INTRODUCTION

The SALP process is used to develop the NRC's conclusions regarding a licensee's safety performance. 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 Quad Cities for the period June 1, 1992, through December 25, 1993.

An NRC SALP Board, composed of the individuals listed below, met on January 5, 1994, to review the observations and data on performance and to assess performance in accordance with the guidance in NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance."

Board Chairperson
T. O. Martin, Deputy Director, Division of Reactor Projects, RIII

Board Members
W. Axelson, Director, Division of Radiation Safety and Safeguards, RIII
J. Dyer, Director, Project Directorate III-2, NRR
W. Forney, Deputy Director, Division of Reactor Safety, RIII

II. PERFORMANCE RATINGS

The current SALP process assesses performance in four functional areas instead of the previous seven. The four areas are Operations, Maintenance, Engineering, and Plant Support. Safety Assessment/Quality Verification will be considered for each of the four functional areas rather than as a separate functional area. The Plant Support functional area will assess radiological controls, emergency preparedness, security, chemistry, and fire protection. Three category ratings (1, 2, and 3) will continue to be used in the assessment of performance in each functional area. Performance trends, improving or declining, have been eliminated as a part of the ratings.

Current Functional Areas and Ratings:

Functional Area	Rating This Period
Plant Operations	3
Maintenance	3
Engineering	3
Plant Support	2

Previous Functional Areas and Ratings:

Functional Area	Rating Last Period
Plant Operations	2
Maintenance/Surveillance	2
Engineering/Technical Support	2
Radiological Controls	2
Emergency Preparedness	1 Declining
Security	1
Safety Assessment/Quality Verification	2

III. PERFORMANCE ANALYSIS

A. Plant Operations

Overall performance in the operations area was adequate. The decline in performance within this area was attributable to management's inability to effectively implement improvement programs initiated in the previous SALP period. Specifically, the lack of direction, ineffective communications, and low operating standards of performance resulted in several events. A lack of timely and effective corrective actions continued to adversely impact performance.

Control of plant operations and the performance of operators was effective during plant transients; however, operations personnel often did not adequately focus their attention on routine activities. Operator response to automatic reactor shutdowns, feedwater regulating valve failures, and a main transformer failure were prompt and appropriate. Communications among

operators were generally good during these events and other activities. However, personnel errors and a lack of procedural compliance were frequent during routine activities, resulting in the inadvertent operation of the wrong equipment on several occasions and one instance of degraded shutdown cooling. Instances of a lack of plant knowledge by non-licensed operators impacted the operation of the plant. Examples included closure of a HPCI steam drain instrument isolation valve that rendered the HPCI pumps inoperable and the inadvertent isolation of the instrument air compressor cooling water supply.

Management oversight of operations and focus on safety was mixed. On the positive side, shutdown risk management was considered good, and a strong training program was evidenced by a high pass rate of operator licensing exams and good operator response to events. However, there were frequent instances of weak oversight of plant activities as evidenced by the HPCI rupture disk event and the high number of errors made during routine activities. Additionally, the acceptance of degraded equipment conditions without rigorous operability determinations demonstrated a weak safety focus. The failure to adequately control equipment status resulted in starting a circulating water pump with the condenser water box hatches open. The procedure rewrite program continued with some improvements. However, overall procedural quality and management's failure to enforce procedural adherence continued to adversely impact performance.

Identification and correction of problems was considered weak overall. There were examples where problems were appropriately identified such as DC grounds and out-of-calibration feedwater flow nozzles. However, resolution of these and other issues was not timely, causing unnecessary operator work-arounds, and, in the case of the feedwater nozzle problem, may have resulted in the reactors being operated for an extended period of time at a level slightly higher than 100% power. Corrective actions taken for personnel errors and poor control of plant activities have not been successful. Examples of personnel errors included starting the wrong emergency diesel generator, starting a residual heat removal (RHR) service water pump instead of the RHR pump, mispositioning a HPCI steam drain pot valve, and four control rod mispositioning events. Examples of poor control of plant activities included rendering the toxic gas analyzer inoperable and an inadvertent loss of a recirculation pump during troubleshooting activities.

The performance rating is Category 3 in this area. During the previous assessment period, this area was rated a Category 2.

B. Maintenance

Overall performance in the maintenance area declined during this evaluation period and was adequate. Management did not effectively maintain station equipment. Programs, procedures, and drawings did not effectively support maintenance and testing activities. Communications between departments for coordination of maintenance activities, and with other licensee sites for resolution of common problems, were weak. Self assessment activities identified problems but lacked the necessary followup to ensure correction.

These factors contributed to a deteriorating station material condition. At the end of the SALP period, actions were initiated to correct identified problems and improve safety system reliability.

Station management, in some cases, did not appreciate the safety significance of degraded systems and in some cases assigned a low priority to preventing and correcting equipment problems. Corrective and preventive maintenance work items were not always evaluated by engineering for potential safety consequences. Management oversight of the maintenance program focused on reviews of maintenance backlogs and ratios that did not accurately reflect the overall material condition of the station. The lack of emphasis on effective maintenance led operators to accept equipment work-arounds rather than identify degraded equipment conditions for repair. As a result, a significant backlog of identified and unidentified work existed during the SALP period that reduced the reliability of important safety systems.

At the end of the SALP period, after completion of an NRC diagnostic evaluation, both units were taken off line for short maintenance outages to correct long-standing equipment problems. Significant long-standing problems with safety system vibrations, pump flows, and motor-operated valves were to be addressed during the outages. These problems had previously been identified by plant events, inservice testing results, Site Quality Verification (SQV) reports, and a special Vulnerability Assessment Team (VAT) report; however, effective followup actions had not been taken to correct the problems and prevent recurrence. Actions taken were often simplistic fixes of the symptoms that lacked an engineering assessment of the root cause and resulted in further failures as evidenced by repeated safety system failures. Management did not take advantage of information and techniques available at other licensee sites for resolution of equipment problems such as vibration of rotating equipment. Housekeeping throughout the evaluation period was mixed.

Programs for corrective maintenance, preventive maintenance, and inservice testing were not effective in maintaining safety equipment in a high state of readiness. Strict adherence to outage schedules contributed to the high backlog of work items. Corrective maintenance work packages were voluminous, required unnecessary reviews before implementation, and, in some cases, created an impediment to fixing equipment. Preventive maintenance recommendations from maintenance history and reliability centered maintenance reviews of systems were not implemented. This contributed, for example, to the HPCI rupture disc failure event. Inservice test programs improperly omitted some safety related check valves and failed to incorporate vendor pump performance curves into the evaluation of data.

Poor procedure and drawing quality contributed to safety system failures, unnecessary shutdowns, and rework. Some technical guidance provided by maintenance and testing procedures omitted the detail necessary to complete the task and return the system to operation. On several occasions problems resulted from insufficient technical information or poor activity coordination that was left to the "skill-of-the-craft" or the maintenance foremen to provide verbally. Inadequate maintenance procedures resulted in instances of inadequate repair of equipment, for example, a failure of an emergency diesel generator cooling water pump, incorrect welds on the regenerative heat

exchanger, and operation with a leaking feedwater check valve. Poor coordination between maintenance and operations resulted in startup with a temporary alteration installed for reactor vessel level indication, operation with inoperable floor drain check valves creating a potential for common mode failure of emergency cooling systems due to flooding, and an inadvertent actuation of the computer room halon fire protection system during testing. In some instances poor quality drawings and procedures also resulted in maintenance on the wrong piece of equipment as was the case with work on the wrong spent fuel pool demineralizer drain valve and replacement of the wrong drywell equipment drain pump. High priority scheduled maintenance that controlled an outage or could cause a shutdown did receive management attention and was usually completed on schedule. This facilitated outage accomplishment and contributed to an effective shutdown risk management program.

The performance rating is Category 3 in this area. During the previous assessment period, the maintenance and surveillance area was rated a Category 2.

C. Engineering

Overall performance in the engineering area was adequate. Several hardware problems, including repetitive problems with electromatic relief valves and abnormalities with main steam line flow instruments, identified during the last SALP period, continue to be deficiencies. The ability of engineers to identify and fix the root cause of plant problems continues to be a concern. These problems include the large backlog of long-standing deficiencies in the RHR system and the lack of adequate system knowledge.

Management involvement and oversight was not effective in implementing a quality engineering program. Communications throughout the engineering organization were often not effective. Examples of this include the conduct of tests on systems without informing the cognizant engineer and a failure by corporate engineering to inform the nuclear engineer of an outdated criticality procedure prior to its use. Another communication deficiency was that the number of outstanding modifications reported to management was significantly lower than the actual number. Management involvement with the motor operated valves (MOV) testing program was weak and lacked safety focus. After significant NRC involvement, the MOV test program was accelerated and safety significance was adequately considered to prioritize testing.

Fundamental weaknesses were identified in the areas of understanding plant design and identification and resolution of engineering problems. With regard to understanding design, there were multiple examples of engineers directing personnel to operate equipment without fully understanding the consequences of their actions. Examples included the isolation of the HPCI drain pots, use of additional fans in secondary containment, and repetitive starts of an air conditioning compressor without knowledge of the potential for equipment failure. Weaknesses in the identification and resolution of plant issues included operation with a high number of pump and motor vibration problems,

inability to correct arcing associated with light bulb replacement on control room panels, and the lack of identification of wiring problems in the HPCI emergency oil pump and turning gear start circuitry.

Weaknesses in engineering support to other organizations contributed to testing and maintenance deficiencies. During the performance of a HPCI operability surveillance, the lack of timely engineering support required the test be terminated prior to collecting the data and resulted in an unnecessary out-of-service for the HPCI system. Also, in some cases engineering did not review and provide input from vendor recommendations for preventive maintenance on important safety systems. Of positive note is the recent engineering involvement and improvement in resolving long-standing issues in the fire protection area.

Self assessment activities were not effective in identifying adverse trends. For example, self assessments did not identify weaknesses in the engineering program or the lack of management oversight of engineering activities and operability determinations. In addition, there continued to be a tendency to accept equipment deficiency evaluations without a rigorous review to determine whether the evaluation was technically correct. Examples were the failure to adequately address numerous fire protection problems early in the assessment period and to identify the collective impact of numerous equipment deficiencies associated with the RHR system.

The performance rating is Category 3 in this area. During the previous assessment period, the area of engineering and technical support was rated Category 2.

D. Plant Support

The overall performance in the plant support area was good. Effective first line supervision and good management support, including devoting sufficient resources to source term reduction, improvements in job planning, and scheduling were noted during the assessment period. Weaknesses noted in this area included a high percentage of contaminated plant areas, high outage and non-outage collective doses, several radioactive material shipping violations, some poor radiation work practices, and problems in the administration of the radiological environmental monitoring program.

The focus on safety issues was good. With the exception of material control and accounting, nearly all aspects of the security and emergency preparedness programs were well implemented. Implementation of the radiation safety program was adequate. The number of personnel contaminations was low and source term reduction efforts were good; however, there was a high collective dose primarily due to high dose maintenance work in the drywell during planned outages. Optimizing collective dose, consistent with good maintenance practices, ALARA coordination, and source term reduction techniques, continues to be a concern.

Management involvement was good. Strong corporate and site management support was evidenced in the security and emergency preparedness functions. For example, security management reversed a negative trend identified in the last assessment period relating to program overview and attention to detail of day-to-day operations and the vital area access program. Emergency preparedness continued to have excellent management support as evidenced by the recent upgrade to the technical support center. Management support to the radiation safety and chemistry areas was good as evidenced by installation of automatic radiation monitoring devices, reduction in the number of controlled area exits, changes to the location of equipment egress points, and improved radiation contamination monitoring. Plant management was also instrumental in obtaining improved radiation protection support from other departments, including support for implementation of the ALARA program. However, management was ineffective in preventing violations of transportation and radiological control requirements and in controlling transfer of radioactive material to uncontrolled site areas. In addition, control of high radiation area barriers, an issue raised during previous assessment periods, continued to be a problem.

Identification and resolution of technical issues were good. For example, emergency preparedness exercise self-critiques identified a large number of minor corrective actions during exercises and drills. Corrective actions to the 1992 exercise performance weaknesses were thorough and timely. Audits of the radiation protection, radioactive waste, and chemistry programs were performance based and comprehensive. Chemistry management developed objective guidance for reviewing instrument performance trend charts to ensure accurate radiochemical analyses. Security developed and continued to improve the scope of their self-audit program. However, several significant plant support issues remain unresolved. These include addressing the high non-outage dose and the large amount of contaminated areas.

Programs and procedures were adequate. Procedures for and implementation of the gaseous and liquid release, process monitor, waste processing, chemistry comparison, physical security, contingency response, and emergency preparedness training programs ranged from good to excellent. However, the radioactive shipments program was weak, as evidenced by several violations in this area. One example of weak implementation of procedures was identified in the inventory program for special nuclear material. Early in the assessment period, the fire protection program was not well implemented for some safe shutdown components that were not routinely demonstrated to be operable.

Support to other organizations and interactions offsite were excellent. For example, physical security and contingency response interfaced very well with local law enforcement agencies. Excellent interactions between the emergency preparedness function and State, County, and NRC officials were demonstrated during Mississippi River flooding. In addition, interactions with state officials on the submittal of revised emergency action levels were good. Radiation and emergency protection staff's support to the plant organization was excellent. Radiation safety support in the areas of job planning and scheduling was improved over the last assessment period.

The performance rating is Category 2 in this area.