Donald C. Cook Nuclear Power Plant - SALP 14
Report No. 50-315/98001; 50-316/98001

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 regarding 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 Donald C. Cook Nuclear Power Plant for the period May 26, 1996 through January 31, 1998. An NRC SALP Board, composed of the individuals below, met on February 11, 1998 to assess performance in accordance with the guidance in NRC Management Directive 8.6, "Systematic Assessment of Licensee Performance."

Board Chairperson

John A. Grobe, Director, Division of Reactor Safety, RIII

Board Members

Marc L. Dapas, Acting Deputy Director, Division of Reactor Projects, RIII
Dr. Richard P. Savio, Acting Director, Project Directorate III-3, NRR

II. PERFORMANCE ANALYSIS

A. Plant Operations

The conduct of plant operations was good. Improvement initiatives resulted in enhanced communications, better command and control, more consistent procedural adherence, and some higher quality normal operating procedures. However, some problems remained in the areas of procedural quality and human performance. Additionally, a number of weaknesses were identified by the NRC in the licensed operator training program and licensee self-assessment efforts failed to identify some similar issues.

Management efforts to identify and resolve issues in the operations area were more effective this SALP period. Early in the assessment period, initiatives to improve the conduct of operations included corrective actions to address human performance issues, implementation of three-way communications, and a reduction of nonessential personnel in the control room during complex plant evolutions. Corrective actions implemented later in the SALP period included a more focused effort to identify deviations from the manner in which the plant was operated as prescribed by operating procedures, and the description of corresponding operational activities in the Updated Final Safety Analysis Report (UFSAR). Other corrective actions were directed at placing more emphasis on an operations centered organization which resulted in better coordination between plant departments.

During the previous SALP assessment period, several examples of poor quality operating procedures were identified by the NRC and the effectiveness of corrective actions to address this problem area was inconsistent. Corrective action efforts to address inadequate procedures and occasional lapses in the area of procedural adherence continued during this assessment period as reflected in the institution of an operations procedure upgrade program. Due to the large number of procedures and the extent of the effort required to review these procedures and correct associated deficiencies, this corrective action initiative was still in progress at the end of the SALP period. Despite efforts by the licensee to improve the quality of its procedures, the NRC continued to identify some problems, such as the inappropriate cross-tieing of safety-related electrical buses and the performance of a Technical Specification required surveillance test before rather than after rendering an AC power source inoperable. These problems indicate that continued management attention is needed.

Following increased management attention, operator professionalism and decorum in the control room improved. While progress was also made in reducing human performance errors, some errors continued to occur. Examples included a mispositioned essential service water valve, the isolation of a boric acid transfer pump without verifying all required prerequisites were met, and the failure to follow procedures while removing a diesel generator inverter from service. Although these errors were not as frequent or significant as those which occurred during the previous assessment period, management's continued focus on human performance improvement is appropriate.

A number of weaknesses with the training program for licensed operators were identified by the NRC inspection staff. These weaknesses included the failure to identify critical tasks and appropriate criteria for simulator scenario development, inconsistencies in individual grading of job performance measure critical tasks, and returning operators to licensed duties without remediation and re-evaluation after they had failed portions of the requalification program. The extent and number of identified weaknesses represent a decline in performance in the licensed operator training program. Near the end of the SALP period, corrective actions to address these weaknesses were being implemented.

The operations department conducted some critical self-assessments in evaluating the scope of previously identified performance weaknesses such as control room decorum and communications problems. While the Quality Assurance (QA) organization did identify some issues including minor procedural adherence and adequacy problems, these issues were not of the same significance and scope as some of those identified by the NRC. For example, in the operations area, the NRC identified an emergency operating procedure with incorrect reactor trip and safety injection setpoints, the failure to have a procedure to perform manual back washing of the essential service water pump discharge strainers, and several weaknesses in the licensed operator training program. The magnitude and extent of the problems identified through the NRC inspection program indicates that the QA organization is not yet fully effective in identifying issues.

The performance rating is Category 2 in this area.

B. <u>Maintenance</u>

Overall performance in the area of maintenance was good. The maintenance staff is experienced and work activities were generally performed in a thorough manner with an emphasis on quality. The maintenance rule was effectively implemented. However, some concerns remain with declining material condition, the quality of procedures, and ineffective corrective actions. In addition, late in the assessment period, the NRC identified some instances, as described in the engineering section of this report, where job order activities resulted in changes to the facility without the proper design change and safety evaluation process being followed.

During this SALP period, an experienced maintenance staff performed work activities with a focus on quality. Procedures were present and in use, supervisors monitored work performance, and for most jobs the planning, coordination, and communications between different departments were effective. For example, good communications and coordination were evident during the replacement of a vital battery cell, and troubleshooting efforts following a failure of an emergency diesel generator voltage regulator were thorough.

Early in the SALP period, some human performance errors occurred during maintenance activities. For example, inadvertent reactor trip and engineered safety features actuation signals were generated during shutdown maintenance. In addition, some difficulties were encountered with the quality of contractor work. However, overall human performance improved near the end of the SALP period due to corrective actions initiated by the new maintenance superintendent and plant management. Management expectations for procedure use and adherence, already established in the operations department, were more clearly defined for all station personnel. Additionally, improvements were noted in the work control process during the SALP assessment period. The corrective maintenance backlog was significantly reduced from approximately 1325 to 525 work items.

The condition of plant equipment resulted in few operational transients, a substantial improvement from the previous SALP period. However, problems with material condition sometimes affected safety system availability and operability. For example, repeated failures of the emergency diesel generators resulted in excessive out-of-service time and a Unit 2 shutdown to effect repairs. Initiatives to improve material condition through the use of a Work-It-Now team were slowed by reorganization of the maintenance department.

A program to improve the quality of maintenance procedures was initiated during the assessment period. Initiatives were implemented to review procedures before use for consistency in level of detail, workability, and accuracy. Workers were asked to provide input on procedure improvements. As a result of these reviews, a 400 percent increase in procedure changes occurred for the 1997 refueling outages. However, due to the number of procedures at the site and the scope of the initial problem, continued effort in improving the quality of procedures is needed. For example, in some instances inadequate procedures contributed to difficulties with procedure adherence, as maintenance personnel struggled with cumbersome directions and inadequate guidance. Some deficiencies were also noted with procedures governing testing programs such as surveillance testing, where ASME Code acceptance data required recalculation. Problems with preconditioning of equipment before conducting Technical Specification required surveillance testing observed during the previous SALP period have been less evident this assessment period, although an example of preconditioning was identified in connection with battery surveillance testing.

The effective resolution of issues associated with maintenance programs continued to present some problems. In some instances, corrective actions were initiated only after the NRC identified problems. For example, activities to improve the program for receipt of new fuel were implemented in response to concerns identified by the NRC. Late in the assessment period, an internal audit identified a number of deficiencies with the corrective action program.

The performance rating in Maintenance is Category 2.

C. <u>Engineering</u>

Engineering problems were identified in important technical areas during this assessment period. Of greatest concern was that engineering personnel, at times, failed to update the design and licensing bases of the plant when engineering activities altered system or equipment design. In addition, several engineering performance errors were identified regarding the conduct of 10 CFR 50.59 safety evaluations, calculations, and engineering analyses. Although the Quality Assurance (QA) organization had identified examples of some of these problems during routine audits, the scope of these problems was not fully developed.

Design control and licensing basis review process errors were manifested in a number of ways during the assessment period. These errors occurred, in part, as a result of a lack of understanding of what constituted a design change to the facility. For example, since 1988, plant personnel operated the plant above the design basis ultimate heat sink temperature without considering the impact that this would have on overall plant operation, and without performing a required 10 CFR 50.59 safety evaluation. This resulted in an apparent unreviewed safety question when the plant operated for 22 days with an average ultimate heat sink temperature above the design basis ultimate heat sink temperature limit, creating the potential for the safety-related equipment in the control room not being able to perform its safety function under design basis conditions. In a second example, plant personnel were in the practice of removing control room annunciators from service without performing required safety evaluations. Specifically, the reactor operators recently blocked three control room annunciators, including one associated with ice condenser temperature, for six months without performing a safety evaluation. These examples reflected the failure by operators and engineers to recognize the importance of operating the facility within the design basis and to appropriately evaluate operations that deviate from design assumptions.

Some examples were also identified where plant personnel made changes to the facility which bypassed the design change and safety evaluation process by accomplishing these changes as job order activities. For example, maintenance was performed to re-drill containment recirculation sump vent holes at locations different than described in the design drawings. In another case, changes from the design were made to the manner in which containment recirculation sump screens were installed. Engineering staff initially viewed these changes as a restoration to the original design, when in fact the facility was being changed. Because these changes were not considered as changes to the facility, the design change and safety evaluation screening processes were bypassed.

Other design control process problems resulted when temporary modifications exceeded installation time limits. A number of other avenues were identified by the licensee late in the assessment period where changes could be made to the facility that bypassed the design control and/or licensing basis review process. At the end of the assessment period, the impact of these additional avenues had not been fully developed or reviewed.

Errors in engineering performance also occurred during design changes and licensing basis reviews. For example, design control errors led to the introduction of fibrous material into the

Unit 1 and Unit 2 containments, challenging the operability of the containment recirculation sumps and emergency core cooling systems (ECCS). Also, a modification was completed that referenced a calculation that had not been conducted. Other design errors included the failure to correctly model the design performance characteristics of the component cooling water heat exchanger, the failure to analyze all potential control air system failure modes that could render safety-related equipment inoperable, and the installation of non safety-related piping on a safety-related auxiliary feedwater pump.

In addition, a number of calculation errors were identified during the assessment period. For example, a failure to account for ECCS instrumentation uncertainties, and the failure to establish the proper refueling water storage tank and containment level setpoints, resulted in the possibility that operators would prematurely perform the ECCS switchover without adequate water level in containment. Also, a heat gain calculation used design input values which were not consistent with the UFSAR and, as a result, engineering personnel failed to identify that containment spray system heat exchanger room temperature limits could be exceeded during certain accident scenarios.

Examples of inadequate safety evaluations were also identified. In one case, a safety evaluation to allow operators to have multiple control rods not indicating fully inserted failed to address shutdown margin requirements. In a second case, engineering personnel failed to identify in a safety evaluation that certain emergency operating procedures would be affected if reactor coolant pump seal injection valve reach rods were disconnected. Also, engineering personnel failed to identify that a change to the plant to perform safety-related valve position verification using the plant computer increased the probability of a malfunction of equipment, and engineering personnel failed to recognize that a change to the emergency operating procedures to align both trains of the centrifugal charging and safety injection systems to a single residual heat removal pump introduced a potential single failure vulnerability and was a change to the design of the plant.

The QA organization activities identified several issues including inadequate training and qualifications of engineering personnel and some problems associated with the 10 CFR 50.59 process. However, the scope of these problems was not recognized, and consequently, not adequately corrected. Following NRC identification of broad engineering problems, plant management initiated several self-assessments that assisted in bounding the scope and depth of these issues.

The performance rating in Engineering is Category 3.

D. <u>Plant Support</u>

Overall, the performance in the area of plant support was good. Strong ALARA planning and work planning contributed to keeping station dose low. Declining performance in the area of radiation worker practices was noted during the end of the assessment period. Performance in the radioactive waste, transportation, and chemistry programs was excellent with strengths noted in technician performance and the water quality program. Security equipment operated well, but security force performance declined in the tactical response area because of personnel staff reductions. The emergency response facilities were well-maintained and the fire protection program was effective.

Radiological work planning and oversight were effective in reducing personnel exposures, and evaluations of work performed were thorough. Additionally, ALARA planning helped maintain station doses low during both routine and outage activities. The radiation protection department provided strong support to station personnel. Radiation work practices were generally good, however, events during the last six months of this assessment period involving poor radiation worker practices indicated a decline in this area. Specifically, in one case, workers entered an extreme high radiation area with their electronic dosimetry turned off and, in another, a worker exited the protected area through the guard house portal monitors without notifying radiation protection personnel that he had alarmed the monitors twice. Another example involved workers in the ice condenser not following the radiation work permit dress requirements. In general, while the radiation protection department staff was effective at identifying problems, they were not as effective in resolving and documenting them. On some occasions, corrective actions were not initiated or were incomplete. For example, the condition report concerning a worker improperly responding to a contamination monitor alarm had not been evaluated by the assigned date, and action on this report was not initiated until NRC inspectors raised questions regarding the corrective actions. Also, prior to NRC review of this matter, no corrective actions were documented or implemented for the procedural violation regarding workers' failure to verify that their electronic dosimetry was on before entering the radiologically controlled area.

Overall, performance in the chemistry, environmental, transportation, and radioactive waste programs was strong. The primary and secondary systems water chemistry was well maintained and monitored. Appropriate actions were taken to investigate and correct any adverse trends. Laboratory performance was also excellent as noted through good technician performance and well-maintained instrumentation. The material condition of the post accident sampling system was improved to ensure the capability of sampling during accident conditions. The radiological environmental monitoring program continued to be effective, and no discernable impact on the environment from plant operations was identified. Additionally, radiological waste and transportation programs were well implemented. The inventory of waste was reduced in order to minimize what was stored on site. However, near the end of this assessment period, an occurrence of a shipment leaving the station without the proper shipping paperwork was identified.

Security equipment operated well because of excellent maintenance support. Implementation of the land vehicle barrier and access authorization programs was very good. However, security force performance declined in the tactical response area because of personnel staff reductions which adversely affected the training program and implementation of the tactical response plan.

The emergency preparedness program was in a high state of operational readiness and emergency response facilities were well maintained. Overall performance during the 1997 emergency exercise reflected effective procedures and training. When completed, the addition of a new Emergency Operations Facility, located in a portion of the Buchanan Office Building, will enhance the program. Plant personnel performed effectively during two actual activations of the Emergency Plan. Effective corrective actions were implemented for problems identified during plant self-evaluations.

The material condition of fire protection equipment was good with few fire protection impairments and low levels of transient combustible materials noted in the plant. Fire brigade training and drills were effective. Self-evaluations in the fire protection area identified issues with appropriate corrective actions being taken. Examples include problems noted during welding, burning, and grinding activities, and deficiencies in emergency lighting procedures.

The performance rating in Plant Support is Category 2.