Duane Arnold Energy Center SALP 11
Report No. (50-331/94001)

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (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 Duane Arnold for the period September 1, 1992, through March 19, 1994.

An NRC SALP Board, composed of the individuals listed below, met on March 30, 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
G. E. Grant, Director, Division of Reactor Safety

Board Members
W. A. Axelson, Director, Division of Radiation Safety and Safeguards
E. G. Greenman, Director, Division of Reactor Projects
J. N. Hannon, Director, Project Directorate III-3, Division of Reactor Projects III/IV, NRR

II. PERFORMANCE RATINGS

The current SALP process will assess 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	1
Maintenance	2
Engineering	2
Plant Support	1

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
Security	2
Safety Assessment/Quality Verification	2

III. PERFORMANCE ANALYSIS

A. Plant Operations

Overall, though problems existed early in the period, performance was excellent and continued the improving trend from the previous assessment period. A strong safety focus and excellent self assessment efforts were major contributors to this performance. Outage planning and emphasis on minimizing shutdown risk continued as significant strengths. The Operations Department effectively identified issues and resolved problems, and demonstrated a self-critical attitude through a rigorous, formal self assessment.

An excellent focus on safety was routinely evident. The licensee's conservative operating philosophy was evidenced in augmented control room operator staffing, utilization of test directors for major surveillance activities, a power reduction during severe weather to reduce the impact of a potential plant transient, and extensive preparations for possible flooding

during the summer of 1993. Outage activities for both the forced outage and the refueling outage were well planned, coordinated, and executed, with proper focus on safety. The shutdown and cooldown activities for the refueling outage incorporated "soft" shutdown industry guidelines. 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 report. Additionally, a number of technical specification improvements were initiated that reduced unnecessary challenges to operations. The Safety Committee and Operations Committee meetings were effective, with good participation and issue followup.

Management involvement in plant operations was excellent and characterized by strong management support and good root cause evaluations and corrective actions. Examples included the hydrogen offgas burn, the loss of the low pressure coolant injection swing bus, the standby diesel generator overspeed trip reset problem, and the missed core spray valve control room indication. Major testing activities during the refueling outage were well-scheduled and coordinated with proper emphasis on shutdown risk, and were effectively monitored by management. The temporary operations shift supervisor program continued to place shift supervisors on year-long rotations in areas such as maintenance planning and quality assurance (QA) and demonstrates continued strong management support for improving cooperation between departments. However, management was not fully effective in ensuring adequate requalification examination administrative security and reducing the contaminated areas around emergency core cooling system equipment to improve operator access. (Progress occurred with respect to the latter concern subsequent to the end of the SALP assessment period.)

Identification and resolution of issues was excellent. Concerns with control room professionalism and shift turnovers, identified early in the assessment period, were effectively and thoroughly corrected, with latter crew briefings orderly and focused on relevant issues. Additionally, physical changes to the control room were made to reduce distractions to operators from work tagout activities. Senior management increased their presence at most of the shift turnovers, including backshifts and weekends. Overall, the strong support for the QA organization by operations made QA more effective.

Programs and procedures for operations were generally good. The Operations Department demonstrated a self-critical attitude through a rigorous self assessment that was part of the overall successful corrective actions for concerns with control room professionalism and personnel errors. Some procedural weaknesses were identified, including an annunciator response procedure that contributed to the loss of the low pressure coolant injection swing bus, and a procedural weakness that resulted in the transfer of reactor protection system power supplies leading to short-term loss of shutdown cooling. In addition, a lack of clear guidance for minimum acceptable setpoints for technical specification required instrumentation led to some slow operability/reportability determinations by operations shift supervisors.

Overall, operator performance was very good. Examples included shutdown and startup activities associated with the refueling outage, the response to a speed increase of the "A" reactor recirculation pump, and the identification

of a failed average power range monitor (APRM). The initial and requalification training programs were very good. While personnel errors (failure to follow procedures) were a challenge during the first part of the assessment period, the programs initiated to address personnel errors were effective in reducing the numbers and significance of errors, especially since the beginning of the current operating cycle.

The performance rating is Category 1 in this area.

B. Maintenance

Overall performance in the maintenance area continued to be good. The Maintenance Department completed a thorough self assessment, which confirmed findings from a previous QA audit and an independent evaluation. Management quickly pursued audit findings to better articulate foreman expectations, improve in-shop reviews, and consolidate plant engineering support. Outage planning, including shutdown risk management, were strengths during this assessment period. However, weaknesses noted in a number of Maintenance Department programs and procedures indicated the need for continued management attention.

Continued management attention toward forced and refueling outage planning was effective. Advanced planning for contingencies and implementation of the Project Leader concept contributed to a successful restart from the refueling outage with few problems. Early planning with established 5-day and 2-week Forced Outage schedules, including verification of adequate parts availability, provided for efficient outage work. Outage risk management continued to be effective with a good safety perspective as demonstrated by good work coordination and proper emphasis on shutdown risk activities.

Communications between departments for coordination of maintenance activities were good. Examples of this include restoration of the "A" circulating water pump and the replacement of the control rod position indicating probes. Management and engineering support of maintenance was apparent in the troubleshooting and corrective actions for the failed High Pressure Coolant Injection (HPCI) surveillance test procedure and the on-line replacement of a safety-related relay.

The material condition of the plant improved from the previous SALP period as demonstrated by a lower rate of equipment failures causing few challenges to plant operations at the end of the SALP period. Improvements in integrated leak rate testing resulted in containment values being well within allowable values. Management attention helped reduce several long-term problems from the previous SALP period. These included the high main steam isolation valve leakage rate, control room chiller operation problems, and the reactor recirculation system motor generator set scoop tube lockups and speed control concerns. Other problems from the previous SALP period, including the refueling bridge and Kaman radiation monitors, continued to need additional work. Problems with the vendor information control program also indicated a need for further management attention.

A thorough questioning attitude in the Maintenance Department was not always evident. For example, during maintenance of the 4160 Vac breakers, and trending of the Barksdale pressure switches, questions were not raised regarding unexpected maintenance activities or findings. Personnel errors during the refueling outage indicated that self-checking needed to be emphasized to assure quality of work. Both the high rate of personnel errors and the lack of a questioning attitude received management attention after the refueling outage and maintenance performance improved.

The on-line corrective maintenance action request (CMAR) backlog had decreased significantly by the end of this assessment period. However, over 50 percent of the CMARs were over 90 days old, a condition that persisted from the previous SALP period. While the Maintenance Department had set an aggressive goal for reducing on-line CMARs by the end of the year, it was not evident that supervision within the Maintenance Department had clearly established a plan to accomplish that goal.

Programs and procedures within the Maintenance Department continue to need improvement. Notable exceptions were the In-Service Inspection and Erosion/Corrosion procedures and programs that were strong, with good oversight by management and knowledgeable, experienced personnel. Weaknesses were noted in the In-Service Testing (IST), Foreign Material Exclusion, and the vendor information control programs. Additionally there had been several instances during the refueling outage where procedures were inadequate to perform the intended function. One example was the 4160 Vac breaker issue where the inadequate maintenance procedures and practices had the potential to lead to multiple failures in a number of systems important to safety. Another example was the failure to include a requirement to perform a required test of the flow referenced APRM scram trip setpoint. The review of vendor manual information and its incorporation into pertinent procedures fell behind, resulting in concerns with procedural adequacy.

The performance rating is Category 2 in this area.

C. Engineering

Overall performance in the engineering area was good. Several positive examples of good engineering evaluations were identified such as: engineering self assessment, internal audits, and 10 CFR 50.59 reviews. However, a number of technical issues identified during the previous SALP period, such as the operability of the control room ventilation system and delays between identification and resolution of engineering concerns, continued to be deficiencies not corrected during the current SALP period. The Motor Operated Valve (MOV) program, cited as a strength in the previous SALP period, was clearly in need of additional attention. Management of day-to-day efforts appeared to be weak as demonstrated by the engineering staff's lack of compliance with their administrative procedures, resulting in the bypassing of required management reviews of procedure and process changes. Recent organizational changes directed at improving communications and engineering effectiveness were being implemented by the facility.

Management involvement in engineering issues was acceptable and showed improvement during the latter part of the SALP period. Management oversight was strong in areas where single deficiencies were being corrected. Examples were the leak in the Reactor Building Closed Cooling Water system and the installation of new river water pump breakers. However, management oversight weaknesses existed in large, multidisciplinary programs, such as the MOV and IST programs.

Identification and resolution of technical issues was mixed. Examples of good performance included the completion of modifications to the Reactor Core Isolation Cooling and HPCI room hardware and the correction of calculational errors made by the architect engineer during construction. However, examples also existed of inadequate attention to detail in the MOV program, a failure to test check valves in the control room chiller Emergency Service Water system, and poor root cause evaluation of problems with the HPCI outboard steam isolation valve. These weaknesses demonstrated an occasional lack of aggressive pursuit of issues and willingness to accept cursory evaluations rather than insist on in-depth investigations.

Support of programs and procedures was good. The Service Water System self assessment and the lubrication degradation issue for MOVs were considered good efforts. Nonetheless, additional attention was needed in several programs, including the MOV, IST and heat exchanger performance monitoring programs.

The extensive experience of the staff was noted as an asset to the engineering department. Facility engineers were able to provide information on plant design, determine errors in vendor calculations, and perform, with reasonable accuracy, general engineering analyses and evaluations consistent with the plant's design basis. The maintenance of the forced outage plan was considered a plus; it effectively coordinated plant efforts during unplanned outages.

Engineering support to other organizations was good as demonstrated by the timely resolution of issues during the recent refueling, troubleshooting of the control building chillers, and diagnosis of a HPCI system surveillance failure.

The performance rating is Category 2 in this area.

D. Plant Support

The overall performance in the plant support area was excellent. Management provided strong support toward improving and maintaining the excellent radiation protection, emergency preparedness, and chemistry programs. Audits in these areas were also observed to have improved with the addition of audit team personnel from other plants. The organizational structure and quality of personnel in the radiation protection organization was a clear strength as demonstrated by the overall effectiveness of the program. Although challenges remain, significant improvements were also observed in the fire protection and security programs.

The radiation protection program reflected a proactive attitude and willingness to take ownership of issues. A strong management commitment and very competent As Low As Reasonably Achievable (ALARA) staff resulted in an improvement in collective dose performance in 1993. A high source term, including high dose rates from recirculation system piping, continued to be a challenge to reducing collective dose. While addressed with some success, the ALARA, source term reduction, and solid radwaste reduction programs have become strengths at the facility. Self assessment early in the SALP period was weak, however, improvements occurred in the latter part of the period as evidenced by effective corrective actions for foreign material exclusion at the spent fuel pool and a lowered threshold for developing radiological deficiency/incident reports.

The chemistry program was excellent. Management's commitment to a strong chemistry program was evidenced by strong operations support for chemistry programs, the continued use of hydrogen water chemistry for corrosion control, zinc injection studies for dose reduction, and excellent water quality programs.

Performance in the area of security improved and was generally effective. Management improved their overview of day-to-day operations of the physical security program. During this period, there was also a major upgrade to the security program, including hardware, which resulted in improved equipment reliability and performance. The support for maintaining these activities also improved. The quality and quantity of security training has shown significant improvement and was very good. Access authorization program problems continued to be identified, however, as in the previous assessment period. Corrective action for these problems was generally reactive and only addressed the specific problems.

The Emergency Preparedness program continued to be a strength during the assessment period with continuing initiatives to improve facilities and procedures. Overall management support, training for onsite and offsite response personnel, and facility maintenance remained excellent. Performance during the 1993 exercise was very good, as was performance in a drill late in the assessment period. Strengths included the annual audit of the Emergency Preparedness program and the relatively stable and experienced staff, including licensed operators, to support the program.

The fire protection program was very good, with activities effectively implemented in meeting the safety objectives of the program. However, problems were identified with taking timely corrective action for inoperable fire barrier seals between the control room and the cable spreading room, and for assigning a designated fire watch as a compensatory measure for inoperable fire barriers without notifying the personnel assigned to this task. The licensee used considerable resources to correct barrier seal problems in the plant, and fire watch problems were effectively addressed. To more effectively address these types of issues in the future, the fire protection group was reorganized to include dedicated engineering staff. Program strengths included control of combustibles, fire watch training, and audits.

The performance rating is Category 1 in this area.