Braidwood SALP 12

REPORT NO. 50-456/94001; 50-457/94001

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 Braidwood for the period October 1, 1992, through February 19, 1994.

An NRC SALP Board, composed of the individuals listed below, met on March 1, 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. L. Axelson, Director, Division of Radiation Safety and Safeguards, RIII
J. E. Dyer, Director, Project Directorate III-2, NRR
G. E. Grant, Director, Division of Reactor Safety, RIII

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
Operations	1
Maintenance	1
Engineering	2
Plant Support	2

Previous Functional Areas and Ratings:

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

III. PERFORMANCE ANALYSIS

A. Operations

Overall performance in the area of operations was excellent and was characterized by improved communications, teamwork, and an emphasis on safety. Plant operating decisions were typically conservative. Effective internal assessments and examination of other licensee's programs were used to identify techniques for improvement. Operators exhibited "ownership" in efforts to achieve excellence as evidenced by a low tolerance for degraded equipment.

An excellent focus on safety was routinely demonstrated. Operating decisions demonstrated a conservative approach to safety and ensured ample margins were provided during infrequent and maintenance related evolutions such as turbine valve testing and main feed regulating valve maintenance. Conservative operability determinations, such as the recent prompt determination involving

control room ventilation, were routinely made. However, during the steam generator tube leak, an opportunity to demonstrate additional conservative measures by shutting down earlier was missed. The shutdown risk program was solidly developed, and the operations staff aggressively focused on shutdown risk considerations.

Management involvement in plant operations was excellent. A proactive approach was taken to mitigate the effects of a small Unit 2 fuel clad leak. Intra-departmental communications among the staff were improved by implementation of an E-mail network. There were noticeable improvements in control room decorum, which became more professional and formal. Effective inter-departmental communications and cooperation resulted in improved planning and implementation of activities and contributed to reducing the risk associated with outages.

Identification and resolution of issues was excellent and was characterized by a low tolerance for malfunctions or degraded equipment conditions in the control room. This contributed to the high reliability and availability of important instrumentation. An outward-looking approach to resolving issues, such as visits to other utilities, both foreign and domestic, resulted in the identification and implementation of process improvements. Examples included: new electronic log-keeping; excellent configuration control; formal control room decorum; and, a thorough, methodical shutdown risk approach. Critical monthly self-assessments were performed, involving all levels of the organization, which effectively identified problems and their root causes. Quality assurance audits were also effective at identifying problems but were limited in scope. Corrective actions were good, with isolated exceptions.

Programs and procedures for operations were very effective. Routine operating procedures were good, and previously identified weaknesses in EOPs were corrected. Program enhancements included computer assisted logs, improved configuration control, and more methodical instructions to mitigate shutdown risk.

Operator performance was excellent with a few exceptions occurring both early and late in the period. Personnel errors, resulting in an inoperable nuclear instrument and a radiological waste tank overflow, were promptly identified and corrected. Operators maintained a high degree of awareness of activities within the plant, effectively conducted evolutions such as startup and shutdown without complications, and responded effectively to infrequent transients. Some of the intra-shift communications during training and simulator exercises were considered to be weak; however, overall requalification examination results were excellent.

The performance rating is Category 1 in this area.

B. Maintenance

Overall performance in the maintenance area continued to be excellent. Management pursued an aggressive program of material condition assessment and corrected degraded equipment conditions at the earliest opportunity to

preclude operational challenges. Maintenance procedures were well-developed and facilitated smooth conduct of tests and repairs with minimal rework. This contributed to the excellent material condition of the two plants throughout the evaluation period.

Management demonstrated a conservative approach to resolving degraded equipment conditions. Plant personnel were sensitive to identify equipment anomalies and management acted to correct potential problems before degraded safety system performance was observed. Examples of this conservatism included the replacement of a residual heat removal pump motor based upon the uncertainties associated with the condition of the oil in the reservoir, and replacement of emergency diesel generator cylinder liners after a clicking noise was heard during a routine surveillance test. The decisions to conduct these maintenance activities eliminated uncertainties with equipment reliability and improved confidence in safety system performance during continued operations.

Planning for major maintenance activities was detailed and effective. Proposed plans included contingencies for potential problems and predetermined decision points for implementation of alternative actions. This approach provided for effective execution of the proposed repair plans and improved shutdown risk planning. Site managers actively toured the station, observing maintenance and testing activities, and providing performance expectations for their staff. Generally, communications between departments for coordination of maintenance activities, and with other sites for resolution of common problems were excellent. However, work and testing activities were not always effectively coordinated resulting in plant challenges caused by systems interactions. Examples of problems included injection from the safety injection accumulators during simultaneous testing of the isolation valves and an emergency diesel generator, and a control room ventilation isolation during simultaneous maintenance on two containment pressure instruments.

Programs and procedures for the conduct of maintenance activities facilitated the scheduling and conduct of high quality repair and testing activities. Maintenance and testing procedures were well-maintained and provided guidance consistent with the latest vendor recommendations for maintenance and testing. Detailed trending programs were established to analyze equipment history data and recommend changes to the existing preventive maintenance program. The inservice inspection and erosion/corrosion programs were found to be effective. Concerns were identified with the inservice test (IST) program relating to stroke testing of some dual function valves and to the leak testing procedures for an auxiliary feedwater check valve. Self assessment activities improved maintenance and testing programs by challenging the technical content of the program and line management decisions on resolution of degraded equipment.

The overall material condition of the plant was excellent and equipment failures caused few challenges to operations. Equipment was well-maintained with little backlog of preventive maintenance requirements, and operator work-arounds were aggressively pursued to resolution. Scheduled tests were rarely missed and post-maintenance testing failures and rework were minimal. Housekeeping was generally good but declined towards the end of the SALP

period. New housekeeping initiatives were being taken within the station to improve worker sensitivity and response to housekeeping concerns.

The performance rating is Category 1 in this area.

C. Engineering

The overall performance in the engineering area was good. While improvement was noted in engineering support to the analysis of technical issues, timely involvement and resolution of the issues were sometimes lacking. Additionally, instances of failure to fully understand or apply design basis information indicated weaknesses in the engineering process.

The area of engineering exhibited a good overall safety focus. Precautionary replacement of the residual heat removal pump motor, root cause determination for a fire pump problem, and the response to a non-conservatism discovered in the Westinghouse analysis of the Low Temperature Overpressure Protection/Cold Overpressure Mitigation System (LTOP/COMS) setpoint were positive examples. However, the engineering organizations were not always proactive with regard to operability determinations, as in the case of a design deficiency regarding the auxiliary feedwater (AFW) system. Also, there were cases of failure to fully understand the design bases, which resulted in avoidable problems or adverse conditions.

Management involvement and oversight of engineering activities was considered to be mixed. The efforts to determine the actual failure mechanism of the fire pumps and the ultimate resolution of a design deficiency concerning the AFW system were good. However, an onsite safety group finding concerning an AFW design deficiency, originally noted in 1989, was inappropriately dismissed. Also, the decision to disregard historical data and the judgment of the engineering staff, regarding the main steam line code safety valves, was nonconservative.

Performance in the area of understanding of design was considered mixed. Safety evaluations pursuant to 10 CFR 50.59 were good, as were post modification test procedures and design calculations. However, weaknesses were noted in understanding of the design basis, including the design for certain power supplies, which led to an ESF actuation when they were being swapped. Also, understanding of the design for the damper backup batteries used in the main control room ventilation system was deficient, and the batteries became inoperative. Licensing submittals were usually of high quality, but some inputs were not properly reviewed to ensure consistency with plant configurations and conditions.

Performance in the area of identifying and resolving technical issues was also considered mixed. Some investigations into the root causes for problems were excellent, such as those addressing problems with the feedwater regulating valve positioner bellows and vibration on the emergency diesel generators. Resolution of problems with the seals for the heater drain pumps, the residual heat removal pump, and the fire pump were considered good. On the other hand, NRC assistance was needed to recognize the AFW pump operability issue.

Performance in the area of support to other organizations was good. There was a demonstrated high degree of involvement and technical expertise in the engineering staff. Improvements were noted in system engineer and site engineer involvement in daily operational activities, and examples of engineering communication and coordination with other stations, especially Byron, were demonstrated throughout the period.

Overall, engineering programs and procedures were good. Most notable was a comprehensive system engineer certification program that heavily emphasized system training. Early in the period, instances were noted where important systems were assigned to inexperienced engineers; but overall, engineering staff members were competent, experienced, and well qualified. Some licensed operators were being integrated into the technical staff. The development and use of senior engineer positions was also considered positive. Quality assurance audit and surveillance programs were adequate.

The performance rating is Category 2 in this area.

D. Plant Support

The overall performance in the plant support area was good. Management provided strong support toward maintaining excellent radiation protection programs, secondary water chemistry, and security programs. Performance in emergency preparedness remained good as evidenced by the 1993 exercise. However, management was not fully effective in implementing emergency preparedness training, and chemistry quality control for in-line sampling and laboratory analyses. Additionally, weaknesses in self-assessment and corrective actions were noted in the areas of chemistry, emergency preparedness, and fire protection.

The radiation protection program continued to be well implemented. Management oversight of the radiological controls and radiological environmental monitoring programs was strong resulting in low collective doses, continued decrease in the amount of contaminated areas in the plant, and improvements in work planning. Teamwork between the radiation protection, chemistry and operations staffs was instrumental in mitigating the effects of the Unit 2 fuel leak problem. However, there were occasional instances of poor radiological work practices. Other strong areas included the post accident sampling system, effluent release program, and solid radioactive waste handling and shipping program.

While management support for implementing secondary side water chemistry initiatives was excellent, management oversight of the chemistry program was weak. This was evidenced by weak quality control practices regarding laboratory analyses and in-line monitoring systems and inadequate corrective actions for these deficiencies.

Performance in the emergency preparedness area was good. The maintenance of emergency response facilities and equipment was excellent. With the exception of the failure to notify the NRC of an Unusual Event, the implementation of the emergency response program was strong as evidenced by the 1993 exercise performance. The interaction with state officials on the submittal of revised

emergency action levels was excellent. However, weaknesses in emergency response training were noted, including deficiencies in tracking qualifications of emergency response personnel, failure to perform critiques following training, and revising the training evaluation requirements without proper management review. Self-assessments of the emergency preparedness area continued to be ineffective in identifying deficiencies in the training program.

Performance in the area of security continued to be excellent throughout the assessment period. Self identification and resolution of issues was very good as evidenced by the effective quality verification program and the corporate sponsored security assessment team. Management attention toward the security program ensured that facilities and equipment were in excellent material condition. During the security power supply events, good teamwork was noted between the onsite staffs and contractor departments. With the exception of isolated inadequate fitness-for-duty screenings, security continued to demonstrate excellent performance.

The implementation of the fire protection program was adequate to achieve safety objectives. Management oversight of the fire protection program was strong in the area of fire prevention, including the control of combustibles, control of oil leaks, housekeeping, and cleanliness of the plant. The self identification of problems was an attribute of the program; however, the adequacy and timeliness of corrective actions was poor. The implementation of corrective actions for blocked open fire doors and high failure rate of emergency lighting units was slow. In addition, management has not focussed sufficient attention and is not proactive on the resolution of fire protection impairments. Compensatory measures were in place for extended periods of time.

The performance rating is Category 2 in this area.