INITIAL SALP REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

456/90001; 457/90001
Inspection Report Nos.

Commonwealth Edison Company
Name of Licensee

Braidwood Station
Name of Facility

February 1, 1989, through January 31, 1990
Assessment Period

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ACRONYMS

AIT	Augmented Inspection Team
ALARA	as-low-as-reasonably-achievable
ANSI	American National Standards Institute
CT	chemistry technicians
dc	direct current
DRP	Division of Reactor Projects
ECCS	emergency core cooling system
ENS	emergency notification system
EOF	Emergency Operating Facility
EOP	emergency operating procedure
EP	emergency preparedness
EQ	environmental qualification
ERO	emergency response organization
ESF	engineered safety feature
F	Fahrenheit
GL	Generic Letter
ISI	inservice inspection
LER	licensee event report
MESAC	micro electronic surveillance and calibration
NRR	Office of Nuclear Reactor Regulation
PM	preventive maintenance
QA	quality assurance
QC	quality control
RHR	residual heat removal
RG	Regulatory Guide
RO	reactor operator
RTD	reactor temperature detector
RWST	reactor water storage tank
SALP	Systematic Assessment of Licensee Performance
SRO	senior reactor operator
TS	Technical Specifications
V&V	verification and validation

I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance on the basis of this information. The program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful feedback to the licensee's management regarding the NRC's assessment of their facility's performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on March 14, 1990, to review the observations and data on performance, and to assess licensee performance in accordance with the guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." The guidance and evaluation criteria are summarized in Section III of this report. The Board's findings and recommendations were forwarded to the NRC Regional Administrator for approval and issuance.

This report is the NRC's assessment of the licensee's safety performance at Braidwood for the period February 1, 1989, through January 31, 1990.

The SALP Board for Braidwood was composed of the following individuals:

Board Chairman

C. E. Norelius, Director, Division of Radiation Safety and Safeguards

Board Members

E. G. Greenman, Director, Division of Reactor Projects (DRP)
J. W. Craig, Director, Nuclear Reactor Regulation (NRR) Directorate III-2
T. O. Martin, Deputy Director, Division of Reactor Safety
W. D. Shafer, Chief, DRP Branch 1
S. P. Sands, NRR Directorate III-2, Project Manager
T. M. Tongue, Senior Resident Inspector

Other Attendees at the SALP Board Meeting

L. R. Greger, Chief, Reactor Programs Branch
M. C. Schumacher, Chief, Radiological Controls and Chemistry Section
W. Snell, Chief, Emergency Preparedness and Effluents Section
J. R. Creed, Chief, Safeguards Section
M. P. Phillips, Chief, Operational Programs Section
H. B. Clayton, Chief, DRP Section 1A
T. E. Taylor, Resident Inspector
D. R. Calhoun, Reactor Engineer
R. B. Landsman, Project Engineer
M. A. Kunowski, Radiation Specialist

C. F. Gill, Senior Reactor Programs Specialist
R. B. Holtzman, Senior Radiation Specialist
T. E. Ploski, Emergency Response Coordinator
G. M. Christoffer, Physical Security Inspector
F. A. Maura, Reactor Insepctor

II. SUMMARY OF RESULTS

A. Overview

This assessment period is from February 1, 1989 through January 31, 1990. Overall improved performance was evidenced in improved enforcement, fewer events, and reduction in personnel errors. This was shown in the Operations, Radiation Protection, Maintenance/ Surveillance, and Security areas. In Operations, improvements were evident in the reduced number of personnel errors and events, excellent communications within and among plant organizations, and management involvement. Improvements in Radiological Controls included secondary water chemistry control and the confirmatory measurements program. Notable improvements in the Maintenance/ Surveillance area included a reduction in personnel errors, more effective work planning and control of work activities. In the Security area, the perimeter detection system was upgraded and the licensee took effective contingency measures during the guard force strike in February and March. Emergency Preparedness remained at a high level as evidenced by the licensee's performance on a challenging annual exercise. Engineering/Technical Support and Safety Assessment/ Quality Verification remained at acceptable performance levels. Management involvement, staffing numbers and qualifications were evident in the improved areas. Responsiveness to NRC initiatives was evident in most areas with the exception of some response delays and licensing issues.

The performance ratings during the previous assessment period and this assessment period according to functional areas are given below:

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

B. Other Areas of Interest

None.

III. CRITERIA

Licensee performance is assessed in selected functional areas. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations. Special areas may be added to highlight significant observations.

The following evaluation criteria were used to assess each functional area:

1. Assurance of quality, including management involvement and control;

2. Approach to the identification and resolution of technical issues from a safety standpoint;

3. Responsiveness to NRC initiatives;

4. Enforcement history;

5. Operational events (including response to, analyses of, reporting of, and corrective actions for);

6. Staffing (including management); and

7. Effectiveness of training and qualification program.

However, the NRC is not limited to these criteria and others may have been used where appropriate.

On the basis of the NRC assessment, each functional area evaluated is rated according to three performance categories. The definitions of these performance categories are as follows:

Category 1: Licensee management attention and involvement are readily evident and place emphasis on superior performance of nuclear safety or safeguards activities, with the resulting performance substantially exceeding regulatory requirements. Licensee resources are ample and effectively used so that a high level of plant and personnel performance is being achieved. Reduced NRC attention may be appropriate.

Category 2: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are good. The licensee has attained a level of performance above that needed to meet regulatory requirements. Licensee resources are adequate and reasonably allocated so that good plant and personnel performance is being achieved. NRC attention may be maintained at normal levels.

Category 3: Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are not sufficient. The licensee's performance does not significantly exceed that needed to meet minimal regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

The SALP Report may include an appraisal of the performance trend in a functional area for use as a predictive indicator. Licensee performance during the assessment period should be examined to determine whether a trend exists. Normally, this performance trend should only be used if a definite trend is discernable.

The trend, if used, is defined as:

Improving: Licensee performance was determined to be improving during the assessment period.

Declining: Licensee performance was determined to be declining during the assessment period, and the licensee had not taken meaningful steps to address this pattern.

IV. Performance Analysis

A. Plant Operations

1. Analysis

Evaluation of this functional area was based on the results of eight routine inspections conducted by resident, regional, and Office of Nuclear Reactor Regulation (NRR) inspectors. This area was also the subject of one special inspection and two Augmented Inspection Team (AIT) inspections.

During the assessment period, both units operated routinely. Unit 1 was shut down between September 1 and December 15, 1989, for its first refueling outage, and Unit 2 was shut down between February 11 to March 26, 1989, for a surveillance outage. The availability of both units was considered good as evidenced by extended runs which are indicative of operators paying greater attention to detail, minimal system challenges, and good equipment performance. Corrective actions for equipment failures were prompt and effective.

The enforcement history for this assessment period reflected fewer violations than the previous assessment period. Four Severity Level IV violations were issued. One of the violations involved the second incident of an inoperable charging pump which was the subject of an enforcement conference. One violation involved failure to make a proper Emergency Notification System (ENS) notification. This was the fourth similar instance within two years and resulted in management action being requested. As a corrective action, the licensee revised the deviation report procedure to include an evaluation of each deviation for reportability. The other two Severity Level IV violations involved operations personnel. One violation resulted in an unplanned Engineered Safety Features (ESF) actuation when operations personnel failed to properly monitor a plant heatup. The second violation involved a direct current (DC) crosstie breaker being closed longer than allowed by Technical Specifications (TS). None of the violations represented a programmatic breakdown. The reduction in the number of violations issued during this assessment period indicates improved regulatory performance.

The licensee requested enforcement discretion on one occasion in anticipation of exceeding the Technical Specification limit on refueling water storage tank vent line temperature. The licensee was slow in recognizing that the problem may have existed the previous night and in bringing it to NRC's attention once it was identified.

The number of unplanned reactor trips during the assessment period was reduced from the number that occurred during the previous assessment period (8 versus 23). Fewer unplanned ESF actuations occurred this assessment period than the previous period (17 versus 39). A number of ESF actuations were due to equipment failures. The number of events resulting in Licensee Event Reports (LERs) was significantly reduced (30 versus 59). Plant operations accounted for 16 LERs this period and 28 during the previous period. About one-third of the LERs attributed to operations for each period were due to personnel errors.

The overall reduction in events and personnel errors was apparently due to several factors. The most important factor was increased management attention and involvement as reflected in greater attention to detail, lessons learned through communications with Byron, and fewer events resulting from missed or improperly performed surveillances. In addition, the plant has moved from a startup mode to a normal operating mode, which appears to also have contributed to the reduction in plant events. The number of events and errors caused by plant operations was reduced. The reduction in the total number of events or trips and those due to personnel error in the period shows an overall improved performance.

Management involvement was evident in all facets of operation, including their presence at shift turnovers, planning meetings, and first-hand observations of plant activities. In addition, biweekly corporate oversight meetings are held onsite with representatives from all organizational levels and work groups. Issues raised during these meetings were tracked and assigned to specific individuals for follow-up and resolution. Members of various Vice President staffs attend these meetings as well as representatives from the Byron and Zion Stations. Braidwood representatives attend the equivalent meetings at those stations. Prior planning and assignment of priorities was evident, for example, during the Unit 1 refueling outage and the return to power despite delays that resulted from equipment problems.

Communications were excellent, within and among the plant organizations. The adequacy and effectiveness of shift turnovers and briefings are considered a strength at Braidwood. All operating shift personnel gain a mental picture of planned shift activities from presentations by the shift supervisor in addition to the presentations by representatives of all maintenance, technical, radiation protection, and chemistry staffs. The licensee has consistently notified the NRC of events and plant issues.

Control room demeanor is considered adequate. Generally, the performance of operators during normal and off-normal evolutions was found to be excellent, as witnessed during transients,

trips, and events such as the residual heat removal (RHR) relief valve failure. Operators showed a good knowledge of the plant status and were in control of activities under their authority. However, there were isolated instances of unprofessional conduct by operators. Management was aware of these instances and took prompt and effective action.

Early in the assessment period, clearing control room annunciators was an active program and on several occasions, "black boards" were achieved for short periods either on each unit or on Unit 0 (common) panels. However, through the assessment period, the number of illuminated annunciators grew such that several were consistently illuminated on each unit and a large number were illuminated on the Unit 0 panels. The number of out-of-service (OOS) tags in the control room was not excessive.

Housekeeping was still considered good at Braidwood. The licensee is continuing the model spaces program, but at a slower pace. While the main access areas in the turbine and auxiliary building looked clean as did the Units 1 and 2 containments before startup of the station after the refueling and the surveillance outages, the inspectors observed a number of instances where housekeeping was allowed to decline. Housekeeping in the less frequently travelled areas, such as steam line tunnels, condensate pump rooms, and main steam isolation valve houses declined; however, housekeeping deficiencies were promptly corrected when pointed out by the resident inspectors. Early in the assessment period, the licensee implemented a system whereby specific individuals were tasked with monitoring housekeeping and material conditions of assigned areas, using a computerized tracking system for follow-up. In addition, near the end of the assessment period, the licensee started using serialized, brightly colored tags to identify housekeeping or material condition deficiencies.

Staffing was ample; key positions were filled with well-qualified personnel. The licensee used a six-shfit crew rotation scheme and extra qualified individuals were available for the licensed positions on shift, such as nuclear station operators, shift control room engineers, shift foremen, and shift engineers. Experience levels of the personnel equaled or exceeded that required for the respective positions. The operations staff was knowledgeable with respect to the Emergency Operating Procedures (EOPs) content, background documents, and applicability to the plant.

Overtime worked in excess of guideline limits was not inordinate as evidenced by record review. This indicates an improvement in the amount of overtime worked beyond TS guidelines this period over the previous assessment period.

In October 1989, NRC operator licensing replacement examinations were administered to twelve candidates. All except one of the senior reactor operator (SRO) candidates passed their licensing examinations. In April 1989, NRC requalification examinations were administered to twelve operators. Eleven of the 12 operators passed their requalification examinations. The SRO who failed successfully passed his requalification re-examination.

2. Performance Rating

The licensee's performance is rated Category 2 Improving in this area. The licensee's performance was rated Category 2 during the previous assessment period.

3. Recommendations

None.

B. Radiological Controls

1. Analysis

This functional area was evaluated on the results of five routine inspections by regional specialists and observations by resident inspectors.

The enforcement history showed more violations this assessment period than the previous period. Four Severity Level IV violations occurred during the current assessment period. One violation in the environmental monitoring program appeared to be due to the lack of procedures and poor communication with the corporate office. Two violations involved failure of the staff to follow station radiation protection procedures and the other violation involved failure of quality control to adequately verify a shipment of radioactive material. The violations were not of major safety significance.

Staffing levels and qualifications were adequate to implement the routine radiation protection and chemistry programs. Permanent assignment of technicians to the chemistry staff appears to have improved proficiency in the laboratory. Currently, 13 of the 21 chemistry technicians (CT) are qualified under American National Standards Institute (ANSI) N18.1-1971. Because mainly non-ANSI qualified CTs are on the midnight shift, qualified chemistry supervisory staff are present to provide supervision. Laboratory personnel appeared to be knowledgeable and capable. An exposure of 13 rem to the thermoluminescent dosimeter of a radiation protection technician appears to be the result of an unknown person tampering with the dosimeter. Similar tampering has not recurred. Experienced individuals

have been appointed as radiation protection manager, health physicist, As Low As Reasonably Achievable (ALARA) coordinator, and radwaste shipping coordinator.

Management involvement in ensuring quality in chemistry and radiation protection was generally good. The water chemistry program required by corporate directive conformed to the Electric Power Research Institute Steam Generators Owners Chemistry Guidelines. Secondary system water chemistry was greatly improved showing a marked decrease in contamination levels. The laboratories were well equipped with state-of-the-art instrumentation: an in-line ion chromatograph was monitoring blowdown and another was being readied to monitor other secondary systems. Data management was highly computerized. ALARA planning and implementation during the first refueling outage indicated a generally good program. However, the source term was low and the program has not yet been seriously challenged. Examples of good performance included extensive use of an optical disc plant layout system for planning, use of a submersible robot for inservice inspection and foreign object retrieval, and planning for emergent work on a steam generator loop stop valve. Management quickly corrected self-identified and other problems with containment access control, use of protective clothing and portable ventilation units, equipment release survey techniques, and possible spread of contamination during testing of containment fan coolers. Instances of poor performance included a failure to recognize a radioactive waste truck survey that exceeded an administrative limit, poor adherence to radiation work permits concerning steam generator sludge lancing, and a deficient procedure that led to wetting of electrical and mechanical connections on the reactor vessel head which resulted in approximately a 4.5 person-rem exposure for the subsequent remedial work.

Licensee responsiveness to NRC initiatives in chemistry and radiation protection has been good as shown by the licensee's participation in nonradiological confirmatory measurements, by improvements in laboratory quality assurance (QA) and quality control (QC) programs, and by commitments to improve calibration and QA for the high radiation sample system.

The licensee's approach to the identification and resolution of technical issues was good. Radiological confirmatory measurements were very good as indicated by 79 agreements in 81 comparisons. Nonradiological comparisons were excellent; all 27 comparisons resulted in agreement. The makeup water system was rebuilt with automatic cutoff of the water on a high conductivity alarm. Makeup water from vendor-supplied temporary cleanup systems will also be controlled by the new system in order to prevent recurrence of the conductivity excursion that occurred during the previous assessment period. The Radiological Environmental

Monitoring Program was good with the exception of two violations pertaining to the Offsite Dose Calculation Manual and the Annual Environmental Report. Both failures were corrected.

Examples of good radiation protection performance included implementation of a hot spot identification and abatement program, use of sensitive plastic scintillation detectors to survey potentially contaminated trash, and implementation of an electronic dosimetry program. Notably, the licensee took prompt, appropriate actions when the initial electronic dosimeter model failed. An example of poor radiation protection performance was a personnel error in surveying a hot spot that resulted in an unplanned and unmonitored exposure of about 1 rem to the extremity of a worker. Personnel radiation dose for the assessment period was about 297 person-rem, which is not atypical. No significant problems were noted involving liquid or gaseous releases or with the solid radwaste program.

2. Performance Rating

The licensee's performance is rated Category 2 Improving in this area. The licensee's performance was rated Category 2 during the previous assessment period.

3. Recommendations

None.

C. Maintenance/Surveillance

1. Analysis

Evaluation of this functional area was based on eight routine inspections performed by the resident inspectors, two inspections performed by regional inspectors, and one by an AIT.

The enforcement history improved in the area of maintenance and surveillance. No violations were issued this period.

Eight of the 30 LERs were attributable to the maintenance/surveillance area. This number is a significant improvement over the number occurring in the previous assessment period (29 of 59 LERs). This period there were three LERs associated with personnel errors compared with 16 during the previous period. The significant reduction in the number of events attributed to problems in this area is indicative of strong licensee management attention that is focused on timely completion of required TS surveillances with a renewed emphasis on attention to detail to reduce personnel errors.

Management's involvement at Braidwood to ensure quality in maintenance/surveillance activities was effective, as evidenced by control of contractors, a low percentage of maintenance rework, and a significantly reduced number of events due to personnel error. Procedures were adequate and usually contained appropriate precautions and notes. Records were complete and well maintained. Management actions to assure quality included the continued use and improvement of the micro-electronic surveillance and calibration (MESAC) unit, which continues to minimize plant challenges during surveillance activities, and effective management of outage and surveillance activities through the work planning group. Results of the planning group included the successful completion of the Unit 2 surveillance outage and the Unit 1 refueling outage. Although the refueling outage extended past the original completion date, this was not indicative of poor outage planning or management. The extension was due to a number of additional equipment problems requiring resolution that were identified during scheduled work activities. The Braidwood outage planning group has sent personnel to monitor and participate in the Byron refueling outage to gain more experience to enhance planning and management of the March 1990 Braidwood Unit 2 refueling outage. Communications between the operations and maintenance departments were enhanced by lead maintenance personnel attending shift briefings, plan of the day meetings, and corporate overview meetings.

Conversely, there were occasions when management involvement in maintenance activities could have been more effective. One area noted was the numerous steam and oil leaks in the secondary plant. This condition persisted for most of the assessment period. When refueling of Unit 1 was completed, it appeared that the leakage problems had been essentially eliminated; however, numerous new leaks appeared within a few weeks of the startup. In early January 1990, the licensee focused more attention and resources in this area with significant improvements and is continuing this effort. Other areas identified during the AIT inspection, relative to the stuck open RHR suction relief valve, were maintenance work instruction clarity and adherence to maintenance procedures. The lack of procedure clarity and adherence were noted as causes of the relief valve's premature actuation. The AIT recommended and the licensee committed to review, consolidate, and improve procedures for adjusting the relief setpoint of the RHR valve and all similar valves used in the plant.

As noted in the previous assessment period, the preventive maintenance (PM) program continues to be a segmented program. The licensee's emphasis on preventative maintenance is illustrated by the fact that approximately 50% of the maintenance work during this assessment period was preventative.

The licensee's approach to the resolution of technical issues from a safety standpoint was generally sound and thorough. Several maintenance/surveillance activities were performed during outages and throughout the assessment period. Examples include the Unit 2 surveillance outage; the Unit 1 refueling outage, replacement of reactor coolant loop 1B wide range hot leg resistor temperature detector (RTD), instrument inverter 111 repair, and the Unit 1 pressurizer manway leak repair. In general, the licensee exercised good control over work activities and used vendor technical expertise when needed.

Excluding reactor trips, four forced outages occurred during the assessment period (four for Unit 1 and none for Unit 2). Three of the forced outages resulted from component problems and one resulted from a pressurizer manway gasket leak due to original construction. The component and manway problems were evaluated and effectively repaired. In addition to the forced outages, there were five unit load reductions to facilitate repair of balance of plant equipment (four for Unit 1 and one for Unit 2). Systems most often needing repair were the condensate and feedwater systems components required to support full power operations. The response for reactive maintenance was prompt.

The licensee had an adequate Inservice Inspection (ISI) staff that was well trained and competent as noted by the NRC's monitoring of ISI activities in the areas of magnetic particle and ultrasonic examinations and eddy current tests on steam generator tubes during the Unit 1 refueling outage. ISI contractor personnel were very knowledgeable and utilized state-of-the-art equipment.

Licensee management was responsive to NRC initiatives, as evidenced by their prompt actions to supply information concerning testing of fasteners addressed in Bulletin 87-02, "Fastener Testing to Determine Conformance with Applicable Material Specifications," and implementation of a pilot program for enhanced root cause analysis. The Problem Analysis Data Sheet system was developed and tested to evaluate equipment reliability using information addressing rework, repetitive maintenance items, and surveillance activities to facilitate an enhanced root cause determination. When the NRC raised concerns relating to maintenance or surveillance activities, the licensee usually responded in a timely and effective manner. Communications between the licensee and the NRC were generally good.

Almost all scheduled TS surveillances were performed on or prior to their due date. Of the many surveillances performed, the licensee and NRC identified five occurrences of surveillances performed late or incomplete for components for a given system. One of the five was identified as a result of corrective actions

for an earlier violation. This is a significant improvement over the previous assessment period, during which 13 instances of late surveillances were identified. This improvement was mainly due to management emphasis on performing surveillances on or before the surveillance due dates. None of the surveillance discrepancies was safety significant and once identified were promptly performed with satisfactory results.

Staffing in the maintenance/surveillance area was adequate. During the assessment period, new individuals were appointed to three management positions, a Superintendent for Maintenance, a Master Mechanic, and a Master Instrument Mechanic. The new appointees appear to be qualified, competent individuals, and the new Master Mechanics have previous operations experience. The average non-outage work request backlog was below the corporate goal. Approximately seven weeks of work with available resources would be required to eliminate the corrective maintenance backlog.

Maintenance department personnel training and qualification programs were acceptable. All personnel received the required training under the accredited program for performance of their assigned duties. Personnel involved in the supervision and performance of assigned tasks appeared to be well trained and knowledgeable of task objectives and equipment operation.

2. Performance Rating

The licensee's performance is rated Category 1 in this area. The licensee's performance was rated Category 2 during the previous assessment period.

3. Recommendations

None.

D. Emergency Preparedness

1. Analysis

Evaluation of this functional area was based on one exercise and one routine inspection, plus a special inspection of the corporate support for the onsite emergency preparedness (EP) program. These inspections were conducted by regional inspectors.

Enforcement history improved during this assessment period. No violations were identified this period.

Management involvement in ensuring quality remained good. A full-time EP coordinator has been assigned since the mid-1980s,

while an EP trainer has become increasingly involved in program activities since his appointment during the previous assessment period. Monthly discussions with Technical Support Center emergency response staff have been initiated to better ensure that they remain aware of program enhancements. These sessions are in addition to periodic tabletop drills that are also beyond the annual EP training requirements. Quality assurance audits have been thorough and include surveillances of distinct program elements. A quarterly performance assessment by corporate EP staff has been implemented.

The licensee's identification and resolution of technical issues was good. The longer term corrective action on the circumstances that resulted in the Severity Level IV violations in the previous assessment period was effective. The relevant Emergency Action Level has been revised and incorporated into the event classification procedure to clearly indicate when an Unusual Event declaration is required for a unit shutdown per TS requirements. The emergency plan was activated on nine occasions through October 1989. All classification decisions were correct and timely. All offsite notifications were completed within the regulatory time limits.

The licensee has shown initiative, such as making annual exercises more challenging. The licensee's performance during the 1989 exercise scenario was very good. The creative scenario required the integrated implementation of the licensee's emergency and security plans in response to an onsite hostage and sabotage situation. Although not necessary to satisfy a regulatory requirement, the County Sheriff's Department personnel participated onsite during the exercise. The exercise also included the dispatch of more than 15 inplant repair teams and the timely assembly and accountability of all onsite personnel.

Staffing levels for the onsite Emergency Response Organization (ERO) remained good, with at least three persons qualified for each key position and no instances of individuals predesignated for multiple key positions. Semiannual, off-hours drills continue to be conducted to successfully demonstrate the capability to augment onshift personnel in a timely manner. Staffing levels for the offsite ERO, which consists of Emergency Operations Facility (EOF), corporate EOF, and Joint Public Information Center personnel, remain excellent with ten or more persons identified from either the corporate office or other nuclear stations for each key and support position. Onsite and offsite ERO position responsibilities remain well defined.

Annual EP training requirements remain clearly defined for key and support positions. Required drills were conducted and critiqued. A review of well-organized EP training records indicated that personnel had completed all training

requirements. Exercise performance and interviews with a small sample of ERO members further indicated that the onsite ERO has been well trained.

2. Performance Rating

The licensee's performance is rated Category 1 in this area. The licensee's performance was rated Category 1 during the previous assessment period.

3. Recommendations

None.

E. Security

1. Analysis

The evaluation of this functional area was based on the results of four inspections performed by regional inspectors and observations made by resident inspectors.

Three Severity Level IV violations and one Severity Level V violation were identified during this assessment period. Three of the four violations identified during this assessment period were due to differing aspects of access control of personnel to vital areas. The other violation was related to improper information protection. None of these represents a programmatic breakdown and the number is not excessive.

The role of management in assuring the quality of the security program was good. Management demonstrated its support through the completion of the upgrading of the perimeter detection system. Additionally, an Error Evaluation Program has been initiated at the station to reduce personnel errors and to improve accountability for such errors.

The licensee's handling of operational security events was good. The security management adequately planned and implemented appropriate contingency requirements to cope with the strike by the security force which occurred between February 2 and March 23, 1989. During this time, frequent telephone contact was maintained between the corporate and station security department and NRC Region III to monitor the progress and performance of security operations. Because of adequate preparation and planning, the amount of protection was not reduced below required levels and security resources did not appear to be strained.

The licensee's station and corporate quality assurance organizations performed security audits and surveillances on a routine basis. The extent of these assessments and the qualifications of the auditors were adequate to assess technical performance, compliance with requirements, and the training and qualifications of personnel relating to the functional area.

The licensee's identification and resolution of technical issues were sound, timely and conservative and were generally a program strength. The licensee demonstrated a clear understanding of the issues through the quality and scope of specific equipment upgrades. The equipment upgrades included the completion of the installation of equipment to detect the state-of-the-art perimeter intrusions to increase the reliability of the system and a redundant access control system. However, the licensee is continuing to pursue the technical resolution of a vital area door closure problem after a year of analysis. Although this problem involves a limited number of doors, it places additional burdens on the security program with regard to compensatory measures and response to an increased number of alarms. The licensee's program for reporting required security events improved during the assessment period. Specifically, with direction from corporate security management, the licensee revised the system and criteria for reporting and logging security events. The system and criteria now closely follow published guidance. Because the system was implemented near the end of the rating period, its effectiveness could not be fully evaluated. Security related records were complete, properly maintained, and readily available.

The licensee demonstrated adequate responsiveness to identified concerns. The security staff was generally responsive to issues that could improve the security program. The resident inspectors were routinely advised of appropriate security concerns in a timely manner. The licensee's security organization maintained adequate communications with NRC.

The licensee maintained good levels of security staffing. In addition to ensuring a level of performance that met regulatory requirements, the level of staffing allowed for timely responses to the changing security needs of the facility without putting undue stress on the system or organization. Positions within the licensee and contractor security organizations were properly identified and responsibilities were well defined.

The training and qualification program for the security organization was adequate. Security personnel were knowledgeable and competent in the execution of their duties. However, the licensee is weak in the area of performance oriented and actual response training. There have been few performance oriented

tactical response exercises that would permit individual security officers to apply tactical skills in an integrated team response to an adversary threat. Near the end of the assessment period, the corporate management initiated actions to analyze specific need for response training and is taking steps to obtain resources to implement future upgrades.

2. Performance Rating

The licensee's performance is rated Category 2 Improving in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

F. Engineering/Technical Support

1. Analysis

This functional area was evaluated on the results of one routine and one EOP team inspection by regional inspectors, several inspections by the resident inspectors, a special safety team inspection, and NRR interactions with the licensee and review of licensee submittals.

Three Severity Level IV violations were issued during this assessment period. The violations involved various aspects of programmatic weaknesses in the control and implementation of the design change process indicating the need for greater attention to detail.

Four LERs were attributed to this area. Three of the four LERs were related to original design issues. The other LER was a combination design/operating personnel error which may have been avoided with a better assessment of their design change.

Management involvement to ensure quality in this area was adequate. This was reflected in the quality and timeliness of the material supplied to support its first NRC requalification examination and in the efficient use and control of Production Training Center evaluators throughout the examination. The facility has continued to evaluate their initial examination review team composition for training and experience to provide a higher quality review for future replacement examinations. Appropriate levels of management appeared to be knowledgeable concerning the equipment qualification (EQ) and Regulatory Guide (RG) 1.97 issues at Braidwood. Adequate management involvement was also noted in the quality of the setpoint calculations used in the EOPs.

Management involvement to ensure the quality of EOPs was strong. This conclusion was based on the overall quality of the EOPs. Minor problems existed in the verification and validation (V&V) program; specifically, the lack of walkdowns of field activities and the failure to include referenced procedures in the V&V program. These weaknesses were promptly corrected.

In general, the implementation of the modification program was mixed. In the area of temporary modifications, improvements have been made such as requiring independent verifications, technical reviews, and controlling critical drawings. In addition, a temporary modification reduction plan has been implemented as well as increased management oversight of temporary modifications. However, as stated earlier, three violations were identified in this area which are indicative of programmatic weaknesses in the control and implementation of the design change process.

The approach to resolution of technical issues from a safety standpoint was mixed. On the positive side a weakness identified during the previous SALP period regarding EQ issues has been corrected. The licensee was thorough in addressing the concerns regarding the use of terminal blocks in EQ applications. Other issues where the licensee demonstrated timely and effective corrective actions were the core flux delta-I problems, response to 10 CFR Part 21 1AV electrical relays, and the feedwater check valves hanging open. Design change safety evaluations were generally sufficient in detail and ensured that unreviewed safety questions did not exist. In addition, engineering evaluations were considered to be generally adequate in depth and content.

On the negative side three issues have experienced excessive delay in resolution. One case involved control of the ventilation systems for the control room and auxiliary building high differential pressures and flows which contributed to the excessive number of illuminated annunciators in the control room. The second case involved the assessment of the impact of the Unit 2 containment spray chemical addition throttle valve found fully open. The third example was the auxiliary feedwater suction pressure switch setting issue. Although these issues were complex and addressed some previously unanalyzed conditions, the delay was considered a weakness. When the containment spray technical analyses were provided, the technique used for the hydrogen generation calculations appeared to be acceptable, however, the calculations were performed at a lower caustic concentration than the analyzed value. This issue is still being reviewed. In the third case (the missed Technical Specification surveillance violation following a design change) the licensee took a considerable length of time (greater than 3 hours) to recognize that a Limiting Condition for Operation (LCO) existed, even after the NRC identified that the

surveillance procedure was inadequate in that it did not include three newly added blind-flange penetrations.

The licensee's responsiveness to NRC initiatives was adequate. The problems identified during the last assessment period regarding operator licensing were corrected. During the 1989 requalification examination the licensee's response to NRC concerns was prompt and correct. In instances where the licensee was slow to respond it appeared to be for good cause. For example, the licensee's responses to issues described in Generic Letters or Information Notices were coordinated with both their sister plant and the corporate offices.

Staffing appeared to be adequate. Participation in both the requalification exam review and implementation was excellent, which in turn minimized delays in executing the requalification process. In general, the technical staff including system engineers were knowledgeable about their assigned systems; however, they appeared to be less knowledgeable of their systems' interactions/interfaces with other systems.

Training and qualification effectiveness in this functional area was adequate. Eleven out of 12 operators passed their initial examination and 11 out of 12 passed their requalification examinations. The operations staff knowledge of EOPs also reflected the effectiveness of the training and qualification program as it related to the EOPs. The engineering staff appeared to have a high degree of knowledge of the systems, their status, and design features as demonstrated by their performance with respect to EQ issues, resolution of Generic Letter 88-17, "Loss of Decay Heat Removal," and the December 1989 Augmented Team Inspection. However, the violation regarding a missed surveillance was apparently caused by unfamiliarity with the Technical Specifications and the need to revise the surveillance procedure following a design change.

2. Performance Rating

The licensee's performance is rated Category 2 in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

G. Safety Assessment/Quality Verification

1. Analysis

This functional area was evaluated based on the results of eight routine inspections by the resident inspectors and two inspections

conducted by regional inspectors. In addition, the NRC staff's reviews of licensee submittals and requests for amendments to the operating license were considered.

The enforcement history for this area improved from the previous assessment period. One Severity Level IV violation was issued. The violation this period involved the failure to initiate a 10 CFR 50.59 evaluation of a safety valve test procedure change resulting from procedural inadequacies. The procedure affected was evaluated and adequate revisions were implemented. A second violation of 10 CFR 50.59 was discussed in the Engineering/Technical Support section of this report.

On one occasion, the licensee requested and was granted discretionary enforcement on a TS required for the minimum vent line temperature for the Unit 2 reactor water storage tank (RWST). This resulted from a previous modification to the RWST heating system that proved to be incapable of dealing with the extreme weather conditions. The failure to promptly recognize an out of specification condition and a better evaluation of the modification could have avoided the urgency of the request.

Licensee management demonstrated satisfactory involvement to assure quality at corporate and site levels during the assessment period. The activities of the onsite review committee, offsite review committee and the onsite nuclear safety groups were as prescribed in governing documents. No significant strengths or weaknesses were identified.

Communications between the NRC and the licensee audit and assessment groups were satisfactory. Conference calls and meetings were arranged as needed and were effective for discussing technical and administrative issues. Most audits and assessments appeared sound and were performance based.

Quality Assurance (QA) department personnel performed audits and surveillances beyond the requirements during this assessment period. The more significant findings included examples of unsecured high radiation doors and improper procurement methods. During this assessment period, reallocated resources resulted in the reorganization of the QA department to facilitate a more effective organization. Also, the manner in which some QA surveillances and audits are conducted was changed to increase their scope. This method of performance identified problems that more limited inspections would not identify. Two identified problems involved the proper completion of radiation dose cards and the security guards' use of protective clothing. The QA department reorganization and introduction of extended audit methods are evidence of a strong commitment by management to improve effectiveness.

The Regulatory Assurance staff made significant contributions in this area by identifying problems and negative trends, tracking commitments, reporting performance trends, compiling information for various issue resolutions, and preparing licensee responses to NRC issues. Almost all licensee responses to violations were good and were submitted in a timely manner. The effectiveness of the Regulatory Assurance staff is considered a strength.

Even though corporate management was involved in the licensing process, the licensee did not exhibit good performance in planning several high-priority licensing actions. One example was the spent fuel pool expansion request submitted on January 3, 1989, with a requested approval date of March 15, 1989, to support the installation schedule. However, the request for use of the spent fuel pool did not justify the actual schedule. As a result of the requested approval date of March, an unnecessary expedited review was initiated. In addition, management involvement was inadequate to properly evaluate the DC crosstie issue resulting in a violation of TS even though this issue had been discussed with the NRC staff prior to the violation.

The quality and technical content of engineering evaluations submitted by the licensee and its contractors to support amendment requests on a number of the submittals were not fully adequate. An example of poor quality, where the approach of ALARA considerations was used as a basis in the proposed amendment request, was the submittal to modify the surveillance requirements for venting of emergency core cooling system (ECCS) piping. The initial submittal contained no information on exposure rates. The staff requested actual exposure data for the areas of concern in order to substantiate the ALARA reductions proposed by the licensee in the submittal. The additional information the staff received, to supplement the amendment, did not address the staff's request. Another example was the amendment request to permit the use of VANTAGE 5 fuel. The NRC staff had to request that supplemental information be provided to address the licensee's finding of "No Significant Hazards" in their review. In some cases, management overview was insufficient to assure consistent quality.

The licensee's resolution of issues that emerged from the technical evaluations was usually prompt. Most reviews were accomplished fairly well and demonstrated more than adequate technical capability which was in keeping with the implied safety significance.

The licensee took sound and thorough corrective actions for equipment problems and operational concerns identified in deviation reports, LERs, and NRC inspection reports. The

technical approaches used by the licensee were usually sound and reflected sufficient conservatism from safety and regulatory perspectives.

One significant improvement over the previous assessment period was the reduction in spurious ESF actuations caused by failed or malfunctioning radiation monitors. This was accomplished by a program to identify trends and the focusing of technical resources to identify and resolve the root cause of the detector problems. However, for some inspection concerns, the licensee supplied inadequate resolutions or untimely information to the NRC. Concerns for which the licensee provided insufficient or untimely resolutions include the feedwater check valves, auxiliary feedwater suction pressure switch settings, control room and auxiliary building ventilation system problems, and the strong chemical impact of the containment spray issue.

The licensee responded to most NRC Bulletins, Generic Letters (GLs), and Part 21 reports in a timely manner, and responses were adequate in content and scope. This was evidenced by the licensee response and actions taken for items associated with the following: Three Mile Island Action Plan; Bulletin 88-09, "Thimble Tube Thinning in Westinghouse Reactors"; GL 89-02, "Actions to Improve the Detection of Counterfeit and Fraudulently Marketed Products"; and a Part 21 report for General Electric 1AV relays. Further examples were identification of several procedural problems during operator licensing exams on the simulator. The licensee promptly generated action items for short-term and long-term corrective actions. In addition, although not required, the licensee tracked and provided or planned timely and acceptable responses to the recommendations identified in the two AITs conducted during the assessment period. This also included acknowledgement of the need for a Mode 5 (cold shutdown) loss-of-coolant accident procedure. Another example was the licensee's response to NRC's EOP team inspection findings.

However, some responses were somewhat slow (e.g., Bulletin 88-04, "Potential Safety-Related Pump Loss", and 10 CFR 50.61, "Fracture toughness requirements for protection against pressurized thermal shock events"). In the case of GL 83-28, "Required Actions Based on Generic Implications of Salem ATWS Events", the response contained insufficient information for staff review. Overall, the licensee demonstrated responsiveness, cooperation, and initiative with respect to resolving safety and licensing issues and maintained satisfactory communication with the NRC.

In general, 10 CFR 50.59 reviews were adequately performed and contained sufficient technical justification commensurate with the items' safety significance. However, violations were issued

in two instances. One was issued because a 10 CFR 50.59 review was not performed for a changed test method for the pressurizer safety valves, and another was issued for an inadequate 10 CFR 50.59 review of the installation of a temporary alteration. This violation was discussed in the Engineering/Technical Support section of this report. Resolution of these two issues involved procedure revision to ensure adequate 10 CFR 50.59 reviews would be performed when needed. When considering the volume of modifications, these two examples do not represent a major programmatic concern.

The QA department, Regulatory Assurance staff, onsite nuclear safety group, onsite review committee, and the offsite review function were staffed by qualified and experienced personnel capable of performing the required audits and technical reviews. The level of experience and quality in licensing administration and corporate management continued to be high. These areas continued to exhibit direction and efficacy over the many complex and varied licensing and technical issues. For this assessment period, three of the regulatory assurance staff and one member of the QA staff had SRO licenses.

2. Performance Rating

The licensee's performance is rated Category 2 in this area. The licensee's performance was rated Category 2 in the previous assessment period.

3. Recommendations

None.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

1. Unit 1

Braidwood, Unit 1, began the assessment period continuing with its scheduled maintenance outage, which began on January 19 1989. Unit 1 was returned to service from this outage on February 2, 1989, after which, the unit operated routinely at varied power levels throughout the majority of the assessment period including several short outages for maintenance and surveillance activities, and equipment repairs. In early September 1989, Unit 1 began its first refueling outage. During reactor heatup from this refueling outage on December 1, 1989, a loss of reactor coolant level in the pressurizer occurred. After a short delay, heatup started and the unit was synchronized to the grid on December 15, 1989. The plant operated routinely through the remainder of the assessment period.

During the assessment period, Braidwood Unit 1 experienced 15 ESF actuations (including 3 safety injections, 1 without water injection, and 2 with water injection), and 5 reactor trips. Three of the reactor trips occurred at greater than 15 percent power and two trips were signals without rod movement. Four of the five trips were the result of equipment problems and the fifth one was the result of a personnel error.

Significant outages and events which occurred during the assessment period are summarized below.

Significant Outages and Events

a. On February 7, 1989, Unit 1 was returned to service from its maintenance and repairs outage for reactor coolant system leakage.

b. On February 12, 1989, Unit 1 was shut down to repair a loop "B" wide range reactor coolant system hot leg defective RTD. The reactor was returned to service on February 13, 1989.

c. On March 6, 1989, an automatic trip occurred on Unit 1, due to inadequate closure of a turbine generator governor valve during the performance of a turbine relay surveillance. Bad contacts were found on the test permissive switch, and the defective diaphragm test valve control switch was repaired. All procedures potentially affected by the failure were reviewed. The reactor was returned to service on March 8, 1989.

d. On April 10, 1989, Unit 1 was manually tripped during a shut down due to a defective No. 4 turbine governor valve. The defective valve was replaced and other secondary plant maintenance also performed. The reactor was returned to service on April 17, 1989.

e. On April 23, 1989, Unit 1 was shut down to repair the instrument Bus No. 111 inverter (which caused the April 10, 1989, shutdown). Repairs were made, and the unit was returned to service on April 26, 1989.

f. On July 1, 1989, Unit 1 began coastdown for its first refueling outage.

g. On July 18, 1989, Unit 1 automatically tripped as a result of lightning strikes which caused enough rods to drop into the core to actuate the power range high negative flux rate trip. The unit remained shutdown for an engineering evaluation of the station lightning protection system for the rod drive control system and to reset the rod drive control system overvoltage protection. The unit was returned to service on July 19, 1989.

h. On September 2, 1989, Unit 1 began its first scheduled refueling and maintenance outage. The Unit achieved criticality on December 11, 1989, and was synchronized to the grid on December 15, 1989.

i. On January 12, 1990, Unit 1 tripped automatically while personnel were troubleshooting a DC ground. The reactor tripped on low steam generator level when a turbine valve closure occurred as a result of opening Breaker No. 9. The Unit was returned to service on January 14, 1990.

2. Unit 2

Braidwood, Unit 2, began the assessment period operating normally and was subsequently shut down on February 11, 1989, for a scheduled maintenance outage. On March 26, 1989, Unit 2 was returned to service from the outage. The unit operated routinely throughout the remainder of the assessment period as the licensee engaged in several reductions in power and experienced outages for maintenance and surveillance activities, and equipment repairs. Towards the end of the assessment period, Unit 2 was in coastdown for its March 1990, refueling outage. Unit 2 ended the assessment period with 136 days of on-line operation.

Braidwood, Unit 2, experienced 2 ESF actuations and 3 reactor trips. All three reactor trips occurred above 15 percent power.

One of the reactor trips was the result of equipment failures, and the other two were the resultant of external forces (i.e., lightning strikes).

Significant outages and events which occurred during the assessment period are summarized below.

Significant Outages and Events

a. During February 11 - March 26, 1989, Unit 2 was in a scheduled maintenance and surveillance outage.

b. On March 26, 1989, Unit 2 automatically tripped as a result of an offsite line fault; the unit was returned to service the same day.

c. On May 11, 1989, Unit 2 automatically tripped on a pressure spike caused from a turbine trip. The unit remained shutdown to repair the "A" phase of 345 kilovolt bus tie circuit breaker 10-10 and a defective control card. The unit was returned to service on May 12, 1989.

d. On July 18, 1989, Unit 2 automatically tripped as a result of lightning strikes which caused enough rods to drop into the core to actuate the power range high negative flux rate trip. The unit remained shutdown for an engineering evaluation on station lightning protection system for the rod drive control system and to reset the rod drive control system overvoltage protection. The unit was returned to service on July 20, 1989.

B. Inspection Activities

Thirty-one inspection reports are discussed in this SALP report (February 1, 1989, through January 31, 1990) and are listed in Paragraph 1 of this section, Inspection Data. Table 1 lists the violations by functional areas and severity levels. Significant inspection activities are listed in Paragraph 2 of this section, Special Inspection Summary.

1. Inspection Data

Facility: Braidwood Nuclear Power Station

Unit 1 Docket No.: 050-00456

Inspection Reports No.: 88024, 89005, 89006, 89009 through 89032, and, 90002 through 90005.

Unit 2 Docket No.: 050-00457

Inspection Reports No.: 88024, 89005, 89006, 89009 through 89030, and 90002 through 90005.

TABLE 1

Number of Violations in Each Severity Level

	FUNCTIONAL AREAS	UNIT 1 III	UNIT 1 IV	UNIT 1 V	UNIT 2 III	UNIT 2 IV	UNIT 2 V	COMMON III	COMMON IV	COMMON V
A	Plant Operations	-	2	-	-	1	-	-	1	-
B.	Radiological Controls	-	-	-	-	-	-	-	4	-
C.	Maintenance/Surveillance	-	-	-	-	-	-	-	-	-
D.	Emergency Preparedness	-	-	-	-	-	-	-	-	-
E.	Security	-	-	-	-	-	-	-	3	1
F.	Engineering/Technical Support	-	1	-	-	1	-	-	1	-
G.	Safety Assessment/Quality Verification	-	1	-	-	-	-	-	-	-

TOTALS	UNIT 1 III	UNIT 1 IV	UNIT 1 V	UNIT 2 III	UNIT 2 IV	UNIT 2 V	COMMON III	COMMON IV	COMMON V
	-	4	-	-	2	-	-	9	1

2. Special Inspection Summary

Significant inspections conducted during the Braidwood SALP 9 assessment period are listed below:

a. During May 8-24, 1989, an EOP team inspection was conducted (Inspection Report Nos.: 456/89011; 457/89011).

b. During April 25-28, 1989, an AIT inspection was conducted of the circumstances surrounding two incidents of inattentiveness of non-licensed employees (Inspection Report Nos.: 456/89014; 457/89014).

c. During June 12 - July 6, 1989, a safety team inspection was conducted of instrument systems for assessing plant conditions during and following an accident as specified in RG 1.97, "Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident," Revision 3 (Inspection Report Nos.: 456/89018; 457/89018).

d. During December 2-4, 1989, an AIT inspection was conducted in response to the Unit 1 RHR system train "B" suction relief valve event of December 1, 1989, (Inspection Report No. 456/89030).

C. Escalated Enforcement Actions

None.

D. Confirmatory Action Letters

None.

E. Review of Licensee Event Reports

Collectively, 30 LERs were issued during this SALP assessment period, in accordance with NUREG-1022 guidelines.

Unit 1 LERs Nos.: 89001 through 89020 and 90002.

Unit 2 LERs Nos.: 89001 through 89008.

Table 2 below shows cause area counts by unit:

TABLE 2

Number of LERs by Cause

Cause Areas	Unit 1	Unit 2
Personnel Errors	8	2
Design Deficiencies	3	1
External	2	1
Procedure Inadequacies	3	2
Equipment/Component	5	1
Other/Unknown	1	1
TOTALS	22	8

Table 3 below shows an LER cause code comparison for the SALP 8 and SALP 9 assessment periods.

TABLE 3

CAUSE AREAS	SALP 8 (13 Mo.) NO.	SALP 8 (13 Mo.) PERCENT	SALP 9 (12 Mo.) NO.	SALP 9 (12 Mo.) PERCENT
Personnel Errors	25	41.7	10	33.0
Design Problems	2	3.3	3	10.0
External Causes	3	5.0	3	10.0
Procedure Inadequacies	8	13.3	6	20.0
Equipment/Component	19	32.2	6	20.0
Other/Unknown	2	3.3	2	7.0
TOTALS	59	100%	30	100%
FREQUENCY LERs/MO		4.5		2.5

NOTE: The above LER information was derived from the review of LERs performed by the NRC staff and may not completely coincide with the licensee's cause code assignments.