INITIAL SALP REPORT

U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-498/91-99
50-499/91-99

Houston Lighting & Power Company

South Texas Project

Units 1 & 2

February 1, 1990 through May 31, 1991

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 based upon 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 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 July 10, 1991, to review the observations and data on performance and to assess licensee performance in accordance with Chapter NRC-0516, "Systematic Assessment of Licensee Performance."

This report is the NRC's assessment of the licensee's safety performance at the South Texas Project for the period February 1, 1990, through May 31, 1991.

The SALP Board for the South Texas Project was composed of:

Chairman

T. P. Gwynn, Deputy Director, Division of Reactor Projects (DRP), Region IV

Members

M. J. Virgilio, Assistant Director, Region IV & V Reactors, Division Reactor Projects III, IV, & V, Office of Nuclear Reactor Regulation (NRR)
L. J. Callan, Director, Division of Reactor Safety (DRS), Region IV
L. A. Yandell, Deputy Director, Division of Radiation Safety and Safeguards (DRSS), Region IV
A. T. Howell, Chief, Project Section D, DRP, Region IV
G. F. Dick, Project Manager (PM), STP, NRR
J. I. Tapia, Senior Resident Inspector, STP, DRP, Region IV

The following personnel also participated in the SALP Board meeting:

J. R. Curtiss, Commissioner
J. M. Montgomery, Deputy Regional Administrator
D. C. Trimble, Technical Assistant, Office of the Commissioner
C. L. Cain, Chief, Nuclear Materials and Safeguards Inspection Section (NMSIS), DRSS, Region IV
J. E. Gagliardo, Chief, Operational Programs Section, DRS, Region IV
B. Murray, Chief, Radiological Protection and Emergency Preparedness Section (RPEPS), DRSS, Region IV
I. Barnes, Chief, Materials & Quality Programs Section, DRS, Region IV
J. L. Pellet, Chief, Operator Licensing Section, DRS, Region IV
W. C. Seidle, Chief, Test Programs Section, DRS, Region IV
T. F. Stetka, Chief, Plant Systems Section, DRS, Region IV
W. B. Jones, Senior Project Engineer, Project Section D, DRP, Region IV
R. J. Evans, Resident Inspector, STP, DRP, Region IV
N. M. Terc, Emergency Preparedness Analyst, RPEPS, DRSS, Region IV
A. B. Earnest, Physical Security Specialist, NMSIS, DRSS, Region IV

II. SUMMARY OF RESULTS

A. Overview

Overall, licensee performance was good and improvements were noted in some areas. However, the licensee was unable to sustain the superior level of performance that was achieved in the previous SALP assessment period in the areas of plant operations, maintenance, and surveillance. Performance in the plant operations area was considered good, having declined from a previous superior level. This decline was also seen in the maintenance/surveillance area. Although strong programs exist, implementation weaknesses in both of these areas resulted in personnel errors that unnecessarily challenged the plant. The need for greater management involvement in both routine operations and event response was evident. Ongoing problems with equipment failures also had a detrimental effect on performance. The radiological protection program was challenged several times during the assessment period because of outages. Performance in this area was superior. Strong and effective management was evident in this area as well as in security. Well qualified and dedicated staff contributed to this overall superior level of performance. A vigorous effort to improve the performance in emergency preparedness was noted. However, the implementation of improvements in this area has yet to be assessed. Engineering and technical support activities were generally strong; however, tne implementation of some plant modifications which would improve the reliability of some safety-related equipment was not timely. Overall, an improving trend was noted in the engineering and technical support area. Safety assessment and quality assurance programs, including the self-assessment process, were evaluated as superior. However, a declining trend was noted because there were some instances where timely recognition and resolution of issues affecting safety-related equipment was not forthcoming.

The licensee's performance category rating for each functional area assessed is provided in the following table, along with the ratings from the previous SALP assessment period.

Functional Area	Rating Last Period 01/01/89-01/31/90	Rating This Period 02/01/90-05/31/91	Trend
Plant Operations	1	2	
Radiological Controls	2	1	
Maintenance/Surveillance	1	2	
Emergency Preparedness	2	2	
Security	1	1	
Engineering/Technical Support	2	2	Improving*
Safety Assessment/ Quality Verification	1	1	Declining**

*Improving Trend - Licensee performance was determined to be improving during this assessment period. Continuation of the trend may result in a change in the performance rating.

**Declining Trend - Licensee performance was determined to be declining during this assessment period and the licensee had not taken meaningful steps to address this pattern. Continuation of the trend may result in a change in performance rating.

III. CRITERIA

The evaluation criteria, category definitions, and SALP process methodology that were used, as applicable, to assess each functional area are described in detail in NRC Manual Chapter 0516, dated September 28, 1990. This chapter is available in the Public Document Room files. Therefore, these criteria are not repeated here, but will be presented in detail at the public meeting to be held with licensee management on August 16, 1991, at 9 a.m.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

This functional area consists primarily of the control and execution of activities directly related to operating the plant.

NRC inspection effort consisted of the core inspection program with regional initiative inspections, including a Balance-of-Plant team inspection, a fire protection program inspection, and three special inspections related to an inadvertent reactor coolant system boron dilution event, a high head safety injection train being inoperable during a reactor startup, and the reliability of the anticipated transient without scram (ATWS) mitigation system actuation circuitry (AMSAC).

The previous SALP report (NRC Inspection Report 50-498/90-06; 50-499/90-06) noted strong performance by operators and excellent management support to reduce reactor trips and recommended that the licensee continue to improve housekeeping efforts plant-wide.

The licensee's overall performance in the plant operations area declined during this assessment period. While individual operator performance continued to be superior during transient recovery operations, equipment failures and operator errors resulted in several unnecessary plant challenges and Technical Specification (TS) violations. While performance remained good overall, it declined from a previously superior level.

Enforcement history in this area was good. Two enforcement conferences were held to discuss an inadvertent dilution event and a violation of TS temperature limits associated with the operation of the high head safety injection system. Neither of these violations resulted in escalated enforcement. Additional violations were identified associated with failures to meet engineered safety features (ESF) power alignment requirements, locked valve program requirements, and licensed operator overtime requirements. An enforcement conference was

held after the assessment period for apparent violations of 10 CFR 50.62, identified by the NRC at the end of the assessment period, pertaining to the failure to maintain AMSAC reliability.

Operations department management was not always effective in reviewing events and conditions for needed corrective actions. The licensee attributed several plant events to insufficient self-verification (e.g., an improperly positioned auxiliary feedwater test return line valve resulted in lowering steam generator water level following a manual reactor trip). However, NRC inspections revealed that other factors may have contributed to personnel errors (e.g., operator fatigue and inaccessibility of some plant equipment). Collectively, the events highlighted the need for greater management involvement in both routine operations and event response. In part, as a result of these problems and the need to ensure that management expectations were better understood and effectively implemented, the licensee implemented the Operational Improvement Plan (OIP). Some improvements were noted at the end of the assessment period as a result of the OIP. For example, a decline in the number of personnel errors and equipment problems was noted during the latter part of the assessment period. However, the overall improvements which are expected from this program have not had sufficient time to become established.

The material condition of the facility improved during the assessment period. Early on, numerous equipment failures in secondary plant systems were identified as contributors to plant events. These equipment malfunctions also caused reactor operators to experience a certain degree of distraction from their normal duties in order to compensate for equipment that was not operating as designed. Operators were compensating for a lack of corrective maintenance by assuming manual control of some equipment. One example of this was a feedwater booster pump recirculation valve which contributed to a reactor trip, when it did not close after sufficient pump flow had been established. Refueling outages in the second half of the assessment period afforded the licensee the opportunity to address some of these long standing equipment problems. As a result, improvements were noted in the availability of automatic control functions for some plant equipment and in a reduction of steam and hydraulic leaks in secondary systems. Housekeeping improved throughout the assessment period and was assessed as superior.

Several long standing equipment problems were noted as a result of inspections conducted in the latter half of the assessment period. Examples include numerous control room control board deficiencies, secondary temperature control valve deficiencies, reliability problems with AMSAC systems, reliability problems with Cooper-Bessemer emergency diesel generators, and continuing problems associated with the polymerization of feedwater isolation valve (FWIV) hydraulic fluid. These problems were indicative of a need for increased management commitment to address and prioritize the resolution of these problems.

During this assessment period, management exhibited strong support for operations by pursuing the completion of design changes intended to result in the elimination of control room nuisance annunciators. Of 26 design change packages for Unit 1, all but one had been completed and 23 of the 26 packages

for Unit 2 had been completed. These design changes had been effective in clearing annunciators which do not indicate an abnormal condition.

Although the licensee implemented an extensive plant labeling program, several deficiencies were noted during the assessment period. NRC licensing examiners observed multiple equipment labeling errors during the April and September 1990 requalification examinations. Most of the mislabeling was associated with electrical panels and breakers. Late in the assessment period, an electrician was shocked because of a labeling problem associated with the No. 22 emergency diesel generator (EDG) lubricating oil heaters.

Overall, plant operating procedures were good and have improved during the assessment period. A 5-year procedure enhancement program had been ongoing for more than 2 years. However, some plant operating procedures were identified which contained weaknesses that led to plant transients. An inadvertent dilution of the RCS at power was one example where an inadequate procedure for restoration of a mixed bed demineralizer to service resulted in a significant challenge to plant operators. One annunciator response procedure was identified as having weaknesses during the recovery from the loss of power to an FWIV hydraulic skid. During this assessment period, all Emergency Operating Procedures were revised and work was begun on the Off Normal and Annunciator Response Procedures. Adherence to procedures by operators has been generally good, but there have been a few instances of procedural noncompliance that have resulted in an inadvertent loss of power to an electrical bus, TS violations, and violations of the locked valve program. Problems with procedure implementation appears to have occurred, in part, because of a relatively high number of temporary changes (Field Change Requests). The licensee initiated a Procedural Compliance Task Force to evaluate the weaknesses in procedural compliance and adequacy. The recommendations of this task force were incorporated into the OIP.

During this assessment period, several senior and middle management personnel changes were implemented. These changes occurred as the result of management position vacancies and the desire to broaden the experience level of several department managers. For example, the Plant Manager was selected as the Vice President of Nuclear Operation. The Chairman of the Nuclear Safety Review Board was selected as the Plant Manager, and the Manager of the Independent Safety Engineering Group was selected as the Manager of Plant Operations following the completion of senior reactor operator training and licensing. The effects of these changes on organizational performance were still being evaluated at the end of the assessment period.

Operating crew performance remained superior in response to plant transients. However, a decline in operator performance was noted based on the number of personnel errors which resulted in challenges to plant equipment and TS violations during routine operations. Some of the events were attributable to ineffective communications and a lack of command and control. For example, a violation of the TS occurred because of miscommunications and a lack of attention to detail that resulted in the misalignment of a safety-related inverter to its alternate power source. Similar observations pertaining to communication weaknesses were noted by NRC licensing examiners during simulator examinations.

Overall operations department staffing was evaluated as good. Operations support staffing was considered superior as evidenced by the personnel that were available to enhance procedures and disposition special problem reports. The licensee continued to maintain staffing levels to support a five-shift rotation in each unit. However, the senior operating license personnel staffing level was minimal to meet shift staffing requirements. The licensee has initiated an aggressive operator training program to increase the number of personnel both licensed and nonlicensed. This program was implemented, in part, because minimal staffing levels resulted in a significant use of overtime during consecutive outages in late 1990 and early 1991, particularly for nonlicensed operators. Several nonlicensed operator candidates hired by the licensee should reduce the amount of required overtime during future outages. Additionally, as a result of attrition there were only five shift technical advisors (STAs) at the end of the assessment period; however, the licensee has a certification program for STAs which should result in increased STA staffing in the near future.

In summary, performance in the area of plant operations was good. Although operators performed well in response to plant events, there was a decline in attentiveness to procedural requirements and equipment status. Overall, operator staffing was good. Equipment failures continued to challenge the operations staff, and the licensee has not corrected some long standing equipment problems. Increased management involvement and oversight was evident during the latter part of the assessment period. Some improvements were noted at the end of the assessment period as a result of the licensee's Operational Improvement Plan. Overall, material condition and housekeeping of the secondary plant continuously improved throughout the assessment period.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Inspection effort in this area should be consistent with the core inspection program, with regional initiatives in the areas of plant operating procedures and the labeling program.

b. Licensee Actions

The licensee should continue to assess performance and implement improvements in human performance and station reliability in order to reduce the number of unnecessary challenges to the plant. The licensee should continue initiatives to improve secondary plant material condition, procedural adequacy and compliance, and plant labeling.

B. Radiological Controls

1. Analysis

This functional area consists primarily of activities related to radiation protection, radioactive waste management, radiological effluent control and monitoring, radiological environmental monitoring, and transportation of radioactive materials.

This area was inspected by both the resident inspectors and region-based inspectors. The region-based inspection effort consisted of the core inspection program and regional initiative inspections involving organization and management controls, training and qualifications, and internal exposure controls.

The previous SALP report noted that strong management support was evident as demonstrated by facility upgrades and appropriate staffing. Also, the previous SALP report recommended that efforts be considered to enhance the as low as reasonably achievable (ALARA) program.

During the previous assessment period, concerns were identified involving the unauthorized shipment of radioactive sewage sludge to an offsite disposal site; lack of a formal training program for radiation protection (RP) professionals; lack of detail in position descriptions; lack of comprehensive quality assurance (QA) audits; and limited ALARA staffing and narrowness of the scope of the ALARA program. During this assessment period, the licensee vigorously pursued these concerns and implemented program improvements to address these issues.

Management support for the radiation protection program was very good, as evidenced by the addition of such technical equipment as electronic alarming dosimetry, extensive audio and video equipment, and robotic observation devices, as well as trips by RP supervisory personnel to observe work activities at other reactor facilities. A corporate health physics (HP) assessor position was authorized to provide support and oversight of the RP program, and the QA department added an auditor with HP experience to its staff.

Audits performed during this assessment period were performance based and included technical recommendations for RP program improvements. RP responses to audit findings were timely and technically correct.

The RP department maintained a good working relationship with other departments. Managers and supervisors were very effective in their supervision of the program and spent sufficient time in the radiologically controlled area (RCA) observing work activities. This was evidenced by the fact that they took an active role, on a rotating basis, in reviewing the radiological conditions and work performed through a series of management inspections of the plant. RP used radiological occurrence reports effectively to identify, trend, and correct problem areas. Management also appeared to have developed good communications with the workers, utilizing both a good system of distributing information and receiving feedback.

RP procedures were good, but the licensee recognized some weaknesses with their use, and implemented a program to rewrite and reorganize RP procedures so as to provide more guidance and make procedures easier to use.

The ALARA program received strong management support as evidenced by increased staffing. ALARA staff members attended offsite training and the ALARA group played a prominent role in outage planning. The licensee achieved superior results as evidenced by the total exposure being below its ALARA goal in each of three major outages that occurred during the assessment period. The quality of the ALARA radiation work permit (RWP) packages also improved. ALARA personnel performed comprehensive reviews and established detailed job histories of the work performed. The ALARA suggestion program had good participation. The licensee was in the early steps of implementing a comprehensive source term reduction program. A source term committee was established and met to maintain radiation levels as low as reasonably achievable.

The licensee maintained a sufficient permanent plant RP staff and did not use contract technicians during routine operations. The turnover rate of approximately 20 percent was slightly higher than the previous assessment period, but no decline in performance was noted. The licensee developed detailed position descriptions for RP supervisors and technicians. Training provided to the RP personnel was very good. The instructors were experienced in RP activities and the instruction included systems training and radiological hazards associated with the systems. The RP technicians received supplemental training in current industry events and special training was presented by plant division supervisors on various topics, such as source term calculations, use of special dosimetry, air sampling, ALARA, and the radioactive waste program. Managers and supervisors attended offsite training in the form of seminars and professional meetings. Communications between the RP and training departments were good.

The licensee implemented written screening examinations to assist in the selection of prospective contract RP personnel. Contractors that successfully passed the screening examination were also required to complete a 3-day course on site-specific procedures and demonstrate their knowledge of the procedures through practical testing.

The RWP program was an effective tool in controlling radiological work activities. The RP staff conducted periodic reviews to determine whether or not the RWP instructions, precautions, and coverage were appropriate for the conditions. The licensee maintained a superior enforcement record with one violation identified by NRC when an individual failed to follow RWP instructions and entered a high radiation area. The RP department identified that an individual deliberately disregarded RWP instructions and entered a highly contaminated area. The licensee took prompt and effective corrective actions for both issues.

The RP department demonstrated the ability to maintain proper RP controls during stressful situations, such as refueling outages. Robotics were used where appropriate for surveillance activities, thereby reducing the dose received by workers. Considering the number of refueling outages during this

assessment period, the number of personnel contaminations was very low and trended downward from outage to outage. Under upper management direction, the RP staff actively sought means to reduce personnel contaminations by employing a task force to evaluate causes and devise methods to prevent contaminations. Individuals were assigned the responsibility to investigate contaminations and propose corrective actions. Radiological housekeeping was generally good and the total contaminated area in both units was very small.

An inspection of the radioactive waste management and radioactive effluent control and monitoring programs was conducted during the assessment period. An effective liquid and gaseous release permit program was maintained to ensure that planned releases to the environment received proper review and approval prior to release. The licensee implemented a radioactive waste effluent management program which demonstrated compliance with the Radiological Effluent Technical Specifications and the Offsite Dose Calculation Manual. Procedures for the sampling and analysis program were well written. No unplanned releases occurred during the assessment period. Testing and surveillance of plant ESF air cleaning systems were performed in accordance with TS requirements.

The Semiannual Radioactive Effluent Release Reports were submitted in accordance with TS requirements and contained the required information. Initial confirmatory dose calculations were performed for offsite dose calculations. The licensee's results were in close agreement with those of the NRC. QA audits of this area were comprehensive and audit teams included members with the appropriate expertise to evaluate the program.

The radiological environmental monitoring program (REMP) was inspected once during the assessment period. No significant problems were identified. The Technical Services Department, including the Radiological Services Laboratory (RSL) administered and implemented a superior REMP in accordance with regulatory requirements. All environmental samples were collected and analyzed as required. No anomalous sample results were identified. Environmental sampling stations and associated equipment were well maintained, calibrated, and operational. The licensee's ability to properly analyze environmental samples was superior. High quality procedures were implemented for radiological instrument calibration and quality control and for sample collecting, processing, and analyzing. The licensee's environmental thermoluminescent dosimeter (TLD) results were in close agreement with the NRC TLD results for collocated TLD sites. Overall, the licensee maintained a superior radiological monitoring program.

An effective meteorological monitoring program was maintained. The annual Radiological Environmental Operating Reports were submitted on time and contained the required information. The licensee experienced a low personnel turnover in the RSL and the staff was well qualified and trained. QA conducted comprehensive audits and surveillances, utilizing personnel who were technically qualified in the radiological environmental area.

The radioactive waste transportation and processing programs were inspected twice during the assessment period. Detailed procedures for classification and characterization of radioactive waste and detailed procedures with checklists

for the preparation and shipment of the waste were implemented. The staff dedicated specifically to this functional area was small, but it was supplemented as needed from the operational RP group and overall the program was very effective.

In summary, improvements were made in the radiological controls area. The RP program was significantly challenged during the assessment period with a series of refueling outages, and performance was superior. The RP program was both aggressive and innovative in its approach to technical issues. Solutions of technical problems were technically correct and timely. Superior performance was also evident in the radiological environmental monitoring, radwaste, chemistry, and transportation areas. The superior performance in this area reflects strong and effective management. Performance of QA and training in this assessment area was very good. Enforcement history was superior.

2. Performance Rating

The licensee is considered to be in a Performance Category 1 in this functional area.

3. Recommendations

None

C. Maintenance/Surveillance

1. Analysis

This functional area consists of activities associated with the maintenance of plant structures, systems, and components; installation of plant modifications; and with the procurement and qualification controls associated with these activities. This area also includes the conduct of surveillance testing, containment integrated leak rate testing, welding activities, and inservice inspection/testing (ISI/IST) activities.

This area was inspected by both the resident inspectors and by region-based inspectors. The region-based inspections included a maintenance team inspection (MTI), a verification of isolation component exemptions (VOICE) inspection (for each unit), a containment integrated and local leak rate test inspection, an inspection of postrefueling startup testing activities, an inspection of ISI and welding activities, a decay heat removal inspection (Generic Letter 89-17), an inspection of complex surveillance activities including the applicable surveillance procedures and records, and a balance of plant (BOP) team inspection.

The previous SALP report characterized performance in this functional area as superior. Prompt management attention resulted in the correction of personnel errors which occurred early in the previous assessment period. The SALP report recommended that the licensee enhance maintenance and surveillance programs.

The two VOICE inspections, which involved a 100 percent visual inspection of accessible containment penetrations, concluded that the licensee implemented strong programs for conducting integrated containment and local leak rate tests. The inspectors found a good training program for the personnel involved in the testing.

Surveillance tests were being scheduled and performed as required by the TS. The missed surveillance rate was extremely low. The approved plant surveillance procedures were of high quality and included acceptance criteria that were clearly stated and referenced in the test results. Appropriate instructions for returning equipment to service were given, and independent verifications and reviews were clearly documented. The licensee's data package retrieval system was considered a strength of the program.

Although the surveillance program was considered superior, there were a number of human errors during the implementation of surveillance procedures which resulted in several plant events, including reactor trips. For example, a technician mislanded a jumper, causing a feedwater isolation valve to close. This resulted in a partial loss of main feedwater flow, and the plant was manually tripped because of lowering steam generator water level. The licensee attributed many of these personnel errors to inadequate self-verification. NRC inspections, however, identified other potential factors that may have resulted in the human errors. Examples included low maintenance technician morale and fatigue from excessive outage overtime.

The postrefueling startup testing procedures were well written. The chronological test logs indicated that the tests generally proceeded smoothly, and the test results indicated that thermal and reactor physics parameters met acceptance and review criteria, and were very close to predicted values. Reactor engineering staff members appeared to be well trained and competent, but two coordinating test result packages did not receive the licensee's usual structured review. The licensee indicated that a more structured review and approval process would be developed for future test packages.

ISI activities were being effectively performed and included the nondestructive testing examinations specified in the ISI examination plans. A weakness in the training of contractor personnel used to perform the ISI examinations was identified. The licensee addressed this weakness by developing and implementing a comprehensive training program for the contractor examination personnel, and by increasing the surveillance and overview of contractor examination activities. Subsequent inspections of Unit 1 ISI work activities verified that the training and overview actions were effectively implemented to resolve the concerns in this area.

The licensee's safety related welding program was generally good. The licensee took effective corrective action to resolve the problems associated with weld monitoring and weld material control that were identified in the previous assessment period.

The licensee had established a comprehensive QA program for Measuring and Test Equipment (M&TE) which was well structured and had been effectively implemented.

Overall, the enforcement record continued to be good. Completed enforcement actions in this functional area did not indicate any significant programmatic weaknesses. However, at the end of the assessment period, apparent violations pertaining to record falsification by contractor maintenance personnel were being considered for escalated enforcement action.

The MTI was performed at the beginning of this assessment period and found that the licensee had a well developed maintenance program. The inspection identified strengths in job planning, the work control process, postmaintenance testing, Independent Safety Engineering Group (ISEG) oversight, material storage, and the deficiency reporting systems. However, weaknesses were identified that indicated the program was not fully implemented. The weaknesses included the prioritization of preventive maintenance on components critical to safety, a relatively large backlog of corrective maintenance activities, maintenance history implementation, the availability of tools, the trending of maintenance data and operational log results, and the implementation of the plant walkdown program. In the BOP area, some of the program work instructions were inadequate and some of the identified work practices resulted in potential industrial safety concerns.

The maintenance work backlog decreased throughout the assessment period. Management was sensitive to the size of the maintenance backlog and provided a contractor work force in order to decrease the backlog.

A worsening trend in the area of procedural compliance and attention to detail during this assessment period resulted in unnecessary challenges to safety systems during maintenance activities. For example, a loss of power to a safety-related electrical bus occurred because an electrician did not follow a preventive maintenance procedure. In another instance, the trip shafts of a Class 1E breaker were not lubricated in accordance with the governing procedure.

The BOP team concluded that the licensee implemented appropriate programs and procedures to effectively operate and maintain BOP equipment. However, the BOP team inspection found that maintenance technicians suffered from eroding morale because of work pressures, impediments to work progress, and personnel safety concerns in the plant. The process for accomplishing maintenance was not always efficient because of inadequate work instructions or communications, and unavailability of repair parts. As a result of this BOP inspection and other licensee, NRC, and third-party identified weaknesses, licensee management initiated the OIP and other initiatives to correct the concerns. An NRC assessment of the OIP, conducted at the end of the assessment period, concluded that the ongoing implementation of the OIP generally resulted in improved working conditions at the site, but it was too early to determine whether other OIP actions would result in improved station availability and reliability.

Several initiatives were taken by the licensee to improve their maintenance program and increase its involvement in the industry. For example, consultants recently completed an indepth evaluation of maintenance activities and programs. The licensee initiated activities to provide mutual support for members through information exchange and identification of common concerns.

Inspections of routine maintenance and surveillance activities identified well trained personnel. Training in the self-verification process was strongly emphasized. The training program for personnel involved with the Appendix J Local Leak Rate Testing was considered to be superior. Maintenance personnel were observed to be conscientious in conducting on-the-job training (OJT) of helpers. However, a licensee investigation that was completed near the end of the assessment period found that many maintenance craft and supervisory personnel were not consistently implementing the OJT requirements. Licensee management attributed this to a failure to properly convey the OJT requirements to maintenance department personnel.

Overall, staffing was considered to be good. Additional positions were developed within the maintenance department, including the maintenance shift supervisor, maintenance director, and head journeyman positions. The maintenance shift supervisor and director positions increased work implementation efficiency and improved communications between departments. A maintenance training section was formed within the maintenance support division. However, the NRC staff determined that for several months in 1990-1991 (during two back-to-back refueling outages) the aggregate maintenance craft personnel overtime was approximately 58 percent. The overtime rate declined, however, following completion of the 1991 Unit 1 refueling outage. Maintenance department morale, at the end of the assessment period, was low because of the failure to resolve the issue of shift crew realignment. The licensee was aware of this issue and was pursuing its resolution.

In addition to implementing a predictive maintenance program, numerous plant upgrades were completed, including cold weather and freeze protection system upgrades, installation of access platforms, and upgrading the turbine generator and support systems. Although the licensee implemented several plant modifications to improve station reliability, there were still a number of long-standing equipment problems that were not resolved. In most of these instances, the licensee's understanding of the issues was generally good; however, some problems recurred because resolution was delayed or the root cause had not been identified. For example, several emergency diesel generator injector holddown studs failed before the licensee determined that the root cause was an inadequate installation method and procedure.

In summary, good management involvement in this area was evident. Maintenance and surveillance programs were a strength, but there were a number of implementation weaknesses, including some that resulted in unnecessary challenges to the plant. Management implemented several initiatives to improve weaknesses identified by self-assessment and third-party assessments. Numerous upgrades to the plant were made to enhance human and equipment performance; however some long-standing equipment problems were not corrected. Only a few minor violations were noted during the assessment period, and they were not indicative of programmatic weaknesses. Apparent violations pertaining to record falsification were being considered for possible escalated enforcement action at the end of the assessment period. Overall maintenance training was considered good, but the licensee found that OJT requirements were not being uniformly implemented because of a lack of understanding of the requirements by maintenance department personnel.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Inspection effort in this functional area should be consistent with the core inspection program, with a regional initiative in the area of work control improvement initiatives.

b. Licensee Actions

The licensee should maintain the good levels of maintenance and surveillance program development and improve program implementation during the next assessment period. The licensee should continue to devote additional attention to the initiatives taken to assure procedural and work instruction adherence. The licensee should continue to improve the material condition of the plant.

D. Emergency Preparedness

1. Analysis

This functional area consists of activities related to the establishment and implementation of the emergency plan and implementing procedures and interactions with onsite and offsite emergency response organizations during planned exercises and actual events.

Evaluation of this functional area was based on the results of three inspections by regional inspectors and observations made by the resident inspectors. The three inspections included one emergency exercise, one operational status inspection, and one regional initiative inspection of the licensee's staff augmentation capabilities.

The previous SALP report identified a repeat of weaknesses from the April 1989 exercise involving the ability to demonstrate timely and effective personnel accountability during site evacuation, and a potentially significant weakness resulting from the underestimation of offsite doses. The SALP report noted that, because of these and other weaknesses identified during the January 1990 operational status inspection, an increased management review was needed. Early in the assessment period, weaknesses were noted in this area; however, improvements have been made during the remainder of the assessment period to address these problems.

Overall, the licensee's response during the course of the April 1990 exercise to demonstrate the ability to protect the health and safety of the public was good. However, several exercise weaknesses were identified, including examples of scenario problems that contributed to the lack of realism and free play, and inhibited the licensee's ability to respond to the simulated emergency. In

addition, the licensee's self-critique of the exercise failed to identify and properly evaluate some important issues arising from this exercise. The licensee, however, performed well on those aspects of the exercise that focused on emergency preparedness capabilities.

The operational status inspection included a walkthrough examination of control room personnel. This inspection concluded that the licensee's emergency preparedness program would ensure an appropriate response should an emergency occur. However, the inspection identified two violations. One violation arose because both technical support centers (TSCs) were not secured and equipment was missing. The other violation concerned the emergency response personnel who had not been trained in new changes to the procedure used for classifying emergencies, making protective action recommendations, and performing offsite dose projections. Aside from this issue, emergency response teams that were interviewed performed well and exhibited a superior level of knowledge of duties and responsibilities.

During this assessment period, the violations and exercise weaknesses were corrected. For example, the licensee took effective actions to ensure that both TSC's would be functional and secured, demonstrating a sound and thorough approach in the resolution of most technical issues. Because of the problems identified during the previous assessment and the early part of this assessment period, a management meeting was held on August 30, 1990. During the meeting, senior licensee management made a strong commitment to upgrade their emergency preparedness program. The licensee demonstrated positive actions during the latter part of this assessment period to carry out their commitments. For example, management changes were made within the emergency preparedness organization including the addition of two licensed senior reactor operators to the emergency preparedness staff. In addition, a consultant group was on site during the past year to conduct a thorough review and update of emergency implementing procedures. Furthermore, on April 8, 1991, the licensee finalized changes to improve personnel accountability during the evacuation of the protected area.

Inspection of shift staffing and augmentation capabilities of the emergency response organization found shift staffing was adequate in numbers and in functional capability. However, a violation was identified due to the licensee's inability to demonstrate that the emergency augmentation staff could respond within the required time. As a result of the inspection, the licensee made commitments to the NRC to implement corrective measures in the immediate future. While all the corrective actions were not completed at the end of the assessment period, the licensee has been improving the ability to augment the emergency response organization in a timely manner.

There were eight events during this assessment period which resulted in the declaration of notification of unusual events (NOUEs) and implementation of the emergency preparedness program. Six of these NOUEs were caused by TS-required shutdowns. Of the other two NOUEs, one involved a fire and explosion in the owner controlled area, and the other involved a small nonsafety-related fire in one of the turbine buildings. Each event was appropriately classified and the required state and federal notifications were made within the required period.

The licensee maintained an excellent working relationship with state and local officials. A sufficient number of emergency personnel were maintained to implement the emergency preparedness program and maintain the emergency plan. During this assessment period, the emergency preparedness staff was augmented with personnel that had strong expertise in engineering and operations.

The licensee was in the process of relocating the operational support centers (OSCs) to locations adjacent to the radiation protection access control points at each unit in order to address concerns with habitability and timeliness of response. In addition, the licensee maintained superior emergency response facilities along with an efficient group of well trained personnel to implement the emergency preparedness program.

Management oversight of the emergency preparedness program was evident by the performance of effective QA audits. Audit findings were resolved in a timely manner and the licensee's responses demonstrated a clear understanding of issues. During this assessment period, a comprehensive program for correcting emergency preparedness issues received strong support from the licensee's senior management.

In summary, although several violations and weaknesses were identified, the licensee undertook vigorous initiatives to perform a comprehensive review and revision of their emergency preparedness program and implemented extensive and effective corrective actions. In addition, the licensee continued to perform independent audits and to improve the quality of emergency preparedness personnel staff. The licensee's response to actual events and training interviews revealed an effective response staff. The licensee demonstrated aggressive actions to improve their overall performance during this assessment period.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area.

3. Recommendations

a. NRC Actions

Inspection effort in this functional area should be consistent with the core inspection program, with a regional initiative to review changes in the program.

b. Licensee Actions

The licensee should ensure that improvements and changes to the emergency preparedness program are fully implemented and continue to provide oversight and support to the emergency preparedness program.

E. Security

1. Analysis

This functional area consists of activities associated with the security of the plant, including all aspects of access control, security background checks, safeguards information protection, and fitness-for-duty activities and controls.

Evaluation of this functional area was based on the results of two routine security inspections, one reactive security inspection, and one fitness-for-duty inspection performed by regional inspectors, and observations made by the resident inspectors. These inspections included a review of the security program, initiatives in the areas of physical protection of safeguards information and records and reports, licensee actions regarding land vehicle bomb contingency, and the fitness-for-duty program. The reactive inspection was conducted in the area of package access control. Also, a Regulatory Effectiveness Review (RER) was performed during January 1991.

The previous SALP report noted strong performance and did not include any specific recommendations.

The Headquarters RER team commented during their exit meeting that no vulnerabilities were detected in the licensee's perimeter detection and assessment aids systems. The RER team recommended some enhancements to the weapons training and contingency drill areas of the licensee's training programs.

The security QA audits for the assessment period were reviewed during the inspection process. The QA team used an individual with nuclear security expertise from outside the utility as a technical expert. The audits were comprehensive and performance oriented. Security management was prompt in dealing with QA issues.

The security management staff was found to be experienced and well organized. The security force was staffed and trained in a superior manner.

The licensee's response to technical issues was superior. One issue identified during this assessment period pertained to concerns related to false and nuisance alarms occurring in the perimeter detection system. This issue is currently under review by NRC staff.

An inspection of the licensee's fitness-for-duty program identified many program strengths. For example, the program was well staffed and the licensee provided employee assistance program services to contractors and vendors. The program was found to be well implemented and supported by plant staff and management. A violation in fitness-for-duty training for supervisors was identified during this inspection.

The licensee submitted two security event reports pertaining to a voluntary reduction of compensatory actions because of severe weather and for an employee bringing a handgun into the protected area. At the end of the assessment

period, the second event and an apparent violation pertaining to package access control were being considered for possible escalated enforcement action. Overall, the enforcement record in the security area continued to be superior during the assessment period.

During daily operations, the security force exhibited vigilance and responsiveness to routine duties and situations requiring their attention.

In summary, inspection results in this functional area indicated that licensee management demonstrated a continued strong commitment to the implementation of the security program, and that they were experienced and well organized. The security force staffing, training, and overall enforcement history were considered superior.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area.

3. Recommendations

None

F. Engineering/Technical Support

1. Analysis

This functional area consists of technical and engineering support for all plant activities. It includes all licensee activities associated with the design of plant modifications, engineering and technical support for operations, training, vendor interface activities, and the fire protection and prevention program.

This functional area was inspected on an ongoing basis by the resident inspectors and periodically by the region-based inspectors. The inspection effort also included a special team inspection to assess the programs and procedures used to operate and maintain BOP equipment and systems. Inspection activities by the region-based inspectors were limited during this assessment period.

The previous SALP report noted that this area reflected good response to emergent issues. Continued management attention was needed to establish error-free plant procedures and drawings. The SALP report recommended that the licensee continue to provide management attention in order to improve and strengthen their engineering and technical support capabilities and the environmental qualification and procurement programs.

The engineering organization was restructured during this assessment period. The Manager of the Plant Engineering Department, who previously reported to the Plant Manager, now reports to the Vice President of Engineering. The consolidation of the Design Engineering and the Plant Engineering Departments

under one manager eliminated some duplication of effort in addressing engineering issues. This resulted in better utilization of the licensee's engineering resources.

In response to a previous SALP observation, the licensee formalized System Engineer Guidelines which define system engineer duties and responsibilities. System engineers were involved in analyzing technical problems and have a sense of ownership for their systems; however, their involvement in some of the other responsibilities defined in the System Engineer Guidelines was limited. The utilization of system engineers was effective in maintaining expertise in system operating characteristics; however, the lack of engineering involvement during maintenance troubleshooting contributed to some plant events. For example, one engineered safety features actuation occurred as a result of troubleshooting an energized ESF load sequencer. The lack of sufficient engineering involvement with this troubleshooting activity may have contributed to this event.

Engineering evaluations were generally good and effective corrective actions usually resulted. However, several ongoing issues were not resolved in a timely manner, thereby resulting in repetitive problems. Specifically, proposed modifications to the FWIVs were not implemented as of the end of the assessment period. In addition, delay of the modifications associated with the FWIVs caused plant operators to increase the surveillance frequency on these valves, thereby increasing the likelihood of plant events. Three loss of feedwater events occurred during the assessment period as a result of equipment and human factor problems during FWIV surveillance testing. Two additional FWIV failures occurred which required a plant shutdown in accordance with the TS.

Strong management commitment to enhancing engineering and technical support programs was noted as evidenced by the number of OIP actions and other initiatives in these areas. For example, the licensee is implementing a comprehensive design basis capture program. The licensee is also upgrading plant drawings (including the development of drawings for skid-mounted equipment), as well as developing control wiring diagrams, load lists, relay and fuse lists, and improving the Master Equipment Database. Many of these actions are scheduled to be completed during the next few years, and are intended to result in gradual improvement in overall plant performance.

The licensee's design modification process provided consistent and proper implementation of design changes and modifications. The design engineering staff was technically competent and well versed in procedural administration. Safety evaluations required by 10 CFR 50.59 were conservative and written with a good degree of detail. These facts were indicative of strong management attention to the design engineering area.

Effective implementation of plant changes and modifications was also observed as the result of the BOP team inspection. The engineering staff appeared fully integrated into the modification process. However, it was also noted that miscommunications between technical support organizations, e.g., system engineers and planners and the operations and maintenance organizations, contributed to delays in accomplishing certain maintenance activities. Other

difficulties in obtaining requisite spare parts, unavailability of support functions on backshifts, and incorrect or incomplete maintenance work requests also contributed to these delays. All of these issues were being addressed by licensee management.

The licensee's response to Generic Letter (GL) 89-13, "Service Water System Problems Affecting Safety-Related Equipment," was adequate, and actions taken were consistent with licensee commitments. The licensee appropriately implemented their commitments made with respect to as-built verification and review of maintenance practices, operating and emergency procedures, training, and biofouling controls. The only weakness observed involved the absence of procedural guidance for conducting the biofouling inspection activity.

The licensee's activities involving their commitments with respect to GL 88-17, "Loss of Decay Heat Removal (DHR)," indicated that management involvement in formulating the response and the engineering evaluations was good. The design included diverse and redundant indications and alarms for core exit temperature, reactor coolant system level, and system performance. The computer screens developed for monitoring DHR performance were state-of-the-art and the instrumentation appeared user friendly.

The NRC administered a licensed operator requalification examination in April 1990 and initial examinations in September 1990. Twenty-eight operators were evaluated during the requalification examinations with only 2 senior reactor operators and 2 reactor operators failing the written portion of the examination. All 15 applicants passed the September initial examinations.

During the NRC preparation for these examinations, a weakness was noted in that the examination material supplied by the licensee's training department had significant deficiencies. The licensee was informed in the April requalification examination report that the material submitted to the NRC for that examination's preparation would be unsatisfactory for future examination preparation and visits. The licensee developed new material to support the September initial examinations; however, this material also exhibited weaknesses in that the material still did not meet the standards for NRC use. In addition, this material, which was required to be submitted by the training department to meet the schedule delineated in the 90-day confirmation letter, was neither timely nor complete.

In summary, the licensee's performance in this functional area was good. The licensee's restructured engineering organization should improve and strengthen performance in this area. Evidence of this improvement was demonstrated in a recent major team inspection that was conducted subsequent to this assessment period. The resolution of most technical issues was good, but some plant modifications were not implemented in a timely manner. Weaknesses associated with the ability of the training department to provide licensed operator examination information to the NRC were noted. Management commitment to improve various engineering and technical programs was evidenced by the number of OIP and other initiatives in these areas.

2. Performance Rating

The licensee is considered to be in Performance Category 2 in this functional area with an improving trend noted.

3. Recommendations

a. NRC Actions

None

b. Licensee Actions

The licensee should continue to emphasize effective engineering support activities particularly with regard to the quality, depth, and timeliness of evaluations performed in support of operational/maintenance activities.

G. Safety Assessment/Quality Verification

1. Analysis

This functional area consists of all licensee review activities associated with the implementation of safety policies including licensee activities related to exemption and relief requests and other regulatory initiatives. In addition, it includes licensee activities related to the resolution of safety issues, safety committee and self-assessment activities, and the effectiveness of the licensee's quality verification function in identifying and correcting substandard or anomalous performance, in identifying precursors of potential problems, and monitoring the overall performance of the plant.

This area was routinely inspected by the resident inspectors and periodically by region-based inspectors. The inspection effort also included a special inspection to assess the implementation effectiveness of the OIP.

The previous SALP report noted that high quality safety reviews were being performed, and management consistently demonstrated a conservative attitude towards safety. The SALP report recommended that the licensee continue to provide high quality safety reviews and project a strong safety attitude to all plant personnel.

The licensee demonstrated a continued high level of performance in the evaluation and implementation of safety policies, with some exceptions. The quality of the submittals was very good, with two noted exceptions (License Requests of November 15, 1990, and January 8, 1991). Licensee responses to staff requests for additional information were timely and accurate. The licensee's response to NRC Bulletins and Generic Letters continued to be technically complete and timely. Generic Letter 90-04 requested information about the implementation of Generic Safety Issues. In addition to the acceptability of the licensee's response, an inspection of the records showed them to be well organized and traceable. The technical bases for infrequent requests for temporary waivers of compliance were of high quality.

NRC review of the licensee's probabilistic risk assessment (PRA) continued throughout the assessment period. In 1990, there were two meetings at the site, two at headquarters, and a number of requests for information. The licensee's preparation for the meetings, as well as their response to NRC questions were thorough and indicated a significant area of emphasis by licensee management.

During this assessment period, there were approximately twice as many Unit 1 licensee event reports (LERs) as there were Unit 2 LERs. The difference in the number of reportable events between the two units is primarily attributable to more Unit 1 events caused by BOP equipment problems, and more operations and maintenance department personnel errors. The quality of the LERs was good; however, NRC inspectors identified that some corrective action commitment dates were not adhered to. In several instances, NRC was not notified that extensions to the commitment dates were needed to implement the identified corrective actions. Root cause analyses and corrective actions for specific events were generally good, but the licensee experienced some problems in the identification of root causes and effective corrective actions for certain, complex events that have recurred. For example, a second Unit 2 reactor trip occurred because of a main generator lockout when the Unit 1 main and auxiliary transformers were energized before the root cause was identified and corrected.

The licensee's programs to assure quality, including the self-assessment process, were generally well implemented. QA audits were performance based. Contract auditors were well utilized to supplement the licensee's QA staff. Additionally, the licensee's SPEAKOUT program was effective in investigating conditions adverse to quality.

The licensee demonstrated a conservative approach to the resolution of most safety issues. The licensee was instrumental in addressing industry problems through the development of utility groups. The licensee's actions were notable for the identification of the extra wire in the solid state protection system, missing O-rings in Conax junction boxes, and resolution of steam generator bottom head drain fatigue cracking. Significant resources were devoted to upgrading the emergency response procedures. The licensee has taken a leadership role in the Cooper-Bessemer Owners' Group. The license established a request for action (RFA) program which was found to be appropriately functioning as an integral part of the corrective action system. The program, however, contained a number of requested actions, including identified out-of-tolerance instruments, that had not been resolved in a timely manner.

There were some examples in which the licensee did not recognize the significance of some safety issues. Because these issues were not recognized, they were not appropriately prioritized for resolution. For example, a Unit 1 reactor trip occurred in March 1990 when main feedwater was lost as a result of a feedwater booster pump tripping on a ground fault. The event was further complicated when the recirculation valve associated with a second feedwater booster pump did not close, as designed, upon automatic start of this pump. The licensee attributed the ground fault to moisture intrusion because of heavy rain. The licensee had planned to implement modifications to prevent recurrence

because the pump had tripped in the past due to moisture intrusion; however, the modifications were not given sufficient priority to prevent recurrence.

The corrective action process was found to be generally effective, with recent enhancements resulting in a significant improvement in the quality of problem reports. The licensee utilized the Systematic Problem Solving Process (SPSP) for evaluating station problem reports (SPRs). This process incorporated the Institute of Nuclear Power Operations (INPO) Human Performance Evaluation System into the root cause code tree, and generic implications into the solution selection process. A corrective action review meeting was instituted after January 1991 to evaluate corrective actions and assure assigned responsibilities were carried out. Only personnel trained in the SPSP were permitted to investigate SPRs related to federal and state violations, events reportable to federal and state agencies, events or situations that suggest a marked breakdown in managements ability to control processes, and plant conditions that constitute an unreviewed safety question. Management demonstrated a strong commitment to the SPSP. More than 330 persons have been provided training on this process, with 250 being from the management technical staff.

The licensee implemented the OIP to improve STP availability and reliability, and make STP a better place to work. Improvement was noted in overall personnel morale; however, improvement in the availability and reliability of the units could not be meaningfully assessed during this assessment period. The development and implementation of the OIP are indicative of management involvement in this functional area.

The licensee's overall performance in this functional area continued at a high level; however, weaknesses were noted with management awareness and involvement in the resolution of some safety issues. The self-assessment process was generally well implemented. The response to, analysis, reporting, and corrective actions for most events were generally good. The licensee's training, staffing, and implementation of the SPSP was superior. The licensee demonstrated a heightened sensitivity to most safety issues.

2. Performance Rating

The licensee is considered to be in Performance Category 1 in this functional area with a declining trend noted.

3. Recommendations

a. NRC Actions

Inspection effort in this functional area should be consistent with the core inspection program, with regional initiatives in the areas of licensee resolution of non-TS related plant equipment problems and the implementation effectiveness of the OIP.

b. Licensee Actions

The licensee should evaluate the self-assessment and corrective action processes to ensure that safety issues are promptly identified, evaluated and the appropriate corrective actions are implemented in a timely manner to assure continued safe operation. The licensee should continue to evaluate the effectiveness of the OIP in order to determine whether intended results are being achieved.

V. SUPPORTING DATA AND SUMMARIES

A. Major Licensee Activities

1. Major Outages

The Unit 1 second refueling outage began on March 30, 1990. The outage duration was 84 days.

The Unit 2 first refueling outage began on September 28, 1990. The outage duration was 101 days.

Unit 1 entered into a forced outage on November 24, 1990, because of a catastrophic leak of the main generator stator water cooling system. This resulted in significant damage to the stator. The unit remained in the forced outage until January 15, 1991, when the third refueling outage was entered approximately 3 months early. The refueling outage was completed in 76 days.

2. License Amendments

Twelve operating license amendments were issued for both units.

3. Significant Modifications

Installed above ground piping and supports to provide freeze protection.

Replaced steam generator power operated relief valve plugs with a new design.

Replaced hafnium control rods with silver-indium-cadmium control rods.

Deleted excessive cool-down protection.

Installed a permanent reactor coolant system level gauge with local indication for use during midloop operations.

B. Direct Inspection and Review Activities

NRC inspection activity during this SALP period included 50 inspections, including several team inspections and special inspections, performed with approximately 6902 direct inspection hours expended, which did not include contractor hours.