ENCLOSURE 1

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

SALP BOARD REPORT 50-29/88-99

YANKEE ATOMIC ELECTRIC COMPANY

YANKEE NUCLEAR POWER STATION (50-29)

ASSESSMENT PERIOD: APRIL 1, 1988 - JULY 31, 1989

BOARD MEETING DATE: SEPTEMBER 21, 1989

## TABLE OF CONTENTS



## REFERENCE INFORMATION

## I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated NRC staff effort to evaluate licensee performance based on data and NRC observations. SALPs supplement the normal regulatory process. They are intended to provide a rational basis for allocating NRC resources and meaningful feedback to the licensee on the NRC's assessment of their performance. SALP criteria are summarized in the Reference Information Section of this report.

This report assesses licensee performance at Yankee Nuclear Power Station from April 1, 1988 through July 31, 1989. An NRC SALP Board, composed of staff members listed in Appendix 1, met on September 21, 1989 to assess performance in accordance with NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." The Board's findings and recommendations were forwarded to the NRC Regional Administrator for approval and issuance.

## II. SUMMARY OF RESULTS

### II.A Overview

The SALP Board assessment noted a continued licensee commitment to the safe operation of the Yankee Nuclear Power Station. During the 16-month assessment period, few challenges to personnel and safety systems occurred. A low number of violations and LERs were identified. This performance is indicative of aggressive management involvement that is strongly oriented towards nuclear safety.

Several licensee strengths were evident during this SALP period. An excellent operational record and good operator performance reflected the positive influence of day-to-day management attention and the upgrading of the licensed operator training program. Although the licensee action to fabricate a plant referenced simulator is noteworthy, the poor quality of operational procedures suggests the need for licensee attention to provide operators with better procedures as tools to do their job.

Licensee performance in the security area reflected a high level of commitment that included the positive involvement of a professional security manager, and equipment upgrades that support the program objectives. Improvements that were implemented to enhance emergency preparedness were clearly demonstrated by licensee performance. This reflected well on the additional management attention that provided resolution to prior NRC concerns and technical issues.

Strong performance in maintenance and surveillance activities occurred in this period. Although some personnel errors continued in implementation, a consistently higher quality of maintenance and maintenance oversight occurred. Engineering and technical support was provided by qualified and stable onsite and offsite staffs that had good morale. This area reflected the continuation of a strong licensee program.

Noteworthy improvements in radiological control occurred. When weaknesses in program implementation were identified, they appeared to be exceptions. Although root cause and corrective action programs in this functional area are maturing, continued management attention is warranted.

The performance reflects a licensee staff that is exceptionally well qualified and knowledgeable, but staffing levels generally tend to be marginal. This condition appears to inhibit progress in some program areas or limit the timely resolution of technical concerns.

II.B Facility Performance Tabulation

This SALP report incorporates the recent NRC redefinition of the assessment functional areas. As indicated in the tabulations below, changes include combining the previously separate Maintenance and Surveillance areas and adding the Safety Assessment/Quality Verification area. The Safety Assessment/Quality Verification section is largely a synopsis of observations in other functional areas. Additionally, Fire Protection, Licensing, Refueling/Outage, Training, Chemistry Control, and Assurance of Quality have been incorporated into the remaining functional areas as appropriate.

| Functional Area | Rating Last Period* | Rating This Period** | Trend |
|---|---|---|---|
| A. Plant Operations | 1 | 1 | |
| B. Radiological Controls | 2 | 2 | (+) |
| C. Maintenance/Surveillance*** | 2 (+)/1 | 1 | |
| D. Emergency Preparedness | 2 (+) | 1 | |
| E. Security | 2 (+) | 1 | |
| F. Engineering/Technical Support | 1 | 1 | |
| G. Safety Assessment/Quality Verification | # | 1 | |
| H. Licensing Activities | 1 | # | |
| I. Refueling/Outages | 1 | # | |
| J. Training & Qualification Effectiveness | 2 (+) | # | |
| K. Assurance of Quality | 1 | # | |

* October 7, 1986 to March 31, 1988
** April 1, 1988 to July 31, 1989
*** Previously addressed as separate areas.
\# Not addressed as a separate area.
(+) Improving trend assigned by SALP Board.

## III. PERFORMANCE ANALYSIS

### III.A Plant Operations (1183 hours, 41%)

#### III.A.1. Analysis

The previous SALP rated this area as Category 1, noting consistent strengths in operator performance, orientation towards nuclear safety, management involvement in operations, and positive attitudes displayed by operating and support personnel at the plant. Areas identified where improvements could be realized included improved control room status reviews and the need to address apparent inconsistencies and ambiguities in existing Technical Specifications (TS).

Operations staff performance continued to be maintained at a high level, as indicated by the low number of personnel errors and good plant performance record. Good operator performance was significant to the licensee achieving a high plant availability factor. Problems noted during plant operations were resolved by operations department management in an aggressive manner that reflected a proper questioning attitude.

The licensee was responsive to prior NRC concerns for the need to improve control room status reviews by providing timely and effective corrective actions. A strong orientation toward nuclear safety was readily apparent in the manner in which the licensee responded to conditions involving main coolant system leakage and off normal performance of equipment important to safety.

Control room equipment status reviews by the operators and shift documentation of equipment deficiencies have improved. For the most part, the licensee was successful in maintaining control room annunciators in a black board status. In general, control room activities reflected proper decorum and shift turnovers were conducted in a professional manner. However, weak licensee performance in properly assessing and resolving a reactivity calculation error during startup was caused by a lack of control over personnel access to the control room.

The Plant Operations Review Committee (PORC) was effective in addressing nuclear safety issues. Open and constructive discussions occurred; the committee typically displayed a conservative safety perspective. The committee was observed to provide continuing assessment and oversight of plant activities as part of licensee event response. PORC involvement was particularly noteworthy in the prompt and well conducted load reduction that occurred in response to main coolant system leakage involving the valve stem leakoff system. The PORC made good use of subcommittees. The development and implementation of revised emergency operating procedures (EOPs) reflected positive subcommittee oversight and involvement.

Operator responses to the four plant trips during the assessment period were conservative and timely. Thorough post-trip reviews were conducted after each scram.

The development, training, and implementation of upgraded EOPs was a positive accomplishment during this SALP period. Operators generally exhibited positive attitudes and a high regard for operations excellence. This was especially evident during the NRC's observations of the operators studying and practicing the EOPs on backshifts and weekends. The licensee's resolution of this issue demonstrated their general responsiveness to NRC concerns.

During this assessment period, the licensee identified a significant weakness that involved operators making adjustments to nuclear instrumentation without appropriate procedural controls. This could have resulted in reactor power trip setpoints that were less conservative than required by TS. Although the licensee received a Severity Level 3 violation for this event, the significance was mitigated by the fact that other instruments provided backup trips which could have shutdown the reactor prior to any of the required safety settings being exceeded. This violation appeared to be an isolated departure from the licensee's otherwise conservative operating philosophy.

The licensee's Fire Protection Program was well managed and maintained. Oversight of fire protection activities, including the conduct of fire brigade training and drills, is the responsibility of a knowledgeable and dedicated Fire Protection Coordinator (FPC). Improvements were made in the training and qualification program for fire watches. The control of hot work was effective. Two events involving degradation of fire protection equipment were reported as LERs. These events were properly identified, analyzed, and reported in a timely manner. The licensee's actions in response to these events were indicative of the conservative manner in which they approach fire protection issues and reflect positively on their commitment to maintain the fire protection program.

The quality of housekeeping at the site was typically good during the SALP period and is indicative of licensee's commitment to proper housekeeping conditions and practices. Plant tours by senior plant managers, personnel responsible for FPC duties, and operations department shift coordinators were frequent and effective in assuring that proper plant conditions were maintained during the refueling outage. Performance in this area continues to be viewed by the NRC as a licensee strength.

During this assessment period, the licensee planned and performed a refueling outage. Good planning and coordination of outage activities occurred prior to and during the outage. Post-outage critiques provided self-assessment opportunities to further improve outage related performance.

Strong and active involvement by corporate and senior plant managers occurred in outage related activities involving planning meetings, daily status meetings and plant tours to assess material conditions. Personnel performance was good. One minor incident, which involved an unplanned but monitored release of 2000 gallons of non-radioactive liquid to the river from a steam generator blowdown line, reflected poorly on operator knowledge of plant status during the outage.

The in-place corrective action system, which utilizes plant information reports (PIRs) to promptly identify the non-reportable concerns, was utilized effectively by the licensee to provide appropriate corrective action to prevent recurrence of this incident.

Active management involvement and responsiveness to prior NRC concerns continues to be evident in the accomplishments of the operator training program. Late in 1988, the licensee obtained a contract with a simulator supplier for the fabrication of a plant-referenced simulator for delivery in November 1990. A training program simulator group has been formed and staffed, and includes a highly experienced Shift Supervisor.

The licensee has made significant progress in upgrading its licensed operator training program. This was evidenced by the addition of several new instructor positions in the training department, the establishment of a strengthened training advisory committee, implementation of more stringent and thorough training program requirements, the establishment of a higher standard for the successful completion of the initial or requalification training program, and the increased involvement of site and corporate managers in various training activities. All initial license applicants for Reactor Operator (RO) and Senior Reactor Operator (SRO) licenses (eight total) passed their respective NRC examination and were granted licenses; their success was due in part to the training upgrades.

However, during the NRC's June 1989 requalification examination, three (3) senior Shift Supervisors failed various portions of their respective examinations. Post-examination analysis of these failures did not identify training program inadequacies as the root cause. Instead, the poor quality of the plant's operating procedures was determined to be the primary problem. Specifically, plant procedures were inadequate in three areas: indexes were inaccurately referenced and were not always correctly cross-referenced; procedural content and guidance were inconsistent depending upon which procedure was referenced; and finally, many procedures were poorly worded which resulted in confusion, misinterpretation, and misunderstanding. This problem had originally been identified by the licensee, but a corrective action plan had not yet been implemented. When additional concerns were identified by the NRC during the operator licensing requalification examination, the licensee's management committed to establish an Operations Support Group which has the responsibility to review and revise all operating procedures to ensure consistency with current plant design and operations. Additionally, the licensee needs to examine the quality of procedures and drawings for other activities including normal system configurations. Routine walkdowns identified inconsistencies regarding piping caps and plugs on test connections and vents. Similarly, drawings or sketches provided within procedures were noted to provide conflicting valve position and locking requirements.

Staffing in support functions within the Operations department is weak. However, the onshift Operations department is adequately staffed, with licensee reliance on modest overtime use to meet watchstanding needs. A five-shift rotation schedule is used. At the close of the assessment period, fifteen (15)

individuals held senior and fourteen (14) individuals held reactor operator licenses. The current class of license candidates is comprised of two SRO upgrades. In addition, two extra shift supervisor positions and two extra senior control room operator positions are on the roster to facilitate operational flexibility. Management initiative to develop an ample number of operators continues to be evident.

In summary, the licensee demonstrated a consistently high level of performance that reflected the active and positive influence of day-to-day management attention.

III.A.2 Performance Rating: Category 1

III.A.3 Recommendations:

Licensee: None.

NRC: None.

III.B Radiological Controls (353 hours, 12%)

III.B.1 Analysis

The Radiological Control Program at Yankee Nuclear Power Station was rated as Category 2 during the previous assessment period. Program weaknesses were identified in the implementation of the ALARA program; posting, labeling and controlling access to High Radiation Areas; and developing and fully implementing a "hot particle" program. During this assessment period, region-based inspectors performed seven routine inspections and one reactive inspection. The resident inspectors reviewed this area on an on-going basis.

The licensee was generally responsive to NRC concerns throughout the assessment period. Most items of concern identified by the NRC were promptly resolved by the licensee. An exception to this was the weakness noted in real time air monitoring, which was identified during the refueling outage but still not fully addressed as of a followup NRC inspection late in the assessment period.

The licensee continued to improve both its Radiation Protection (RP) Technician Training Program and General Employee Training. The licensee showed good initiative in video recording several radiologically significant job evolutions for training and ALARA purposes. A weakness was noted in training workers in a proper undress procedure for crossing a double step-off-pad in containment during the refueling outage. The licensee's short-term action of placing written instructions at the step-off-pad was not effective in correcting this problem. Therefore, continued emphasis on corrective measures prior to the next refueling outage is warranted. Otherwise, the training and qualification program was effective, with a lack of training only occasionally being identified as the root cause for minor incidents.

The RP Department was staffed with highly experienced and qualified personnel throughout the assessment period. This was partially due to the low turnover of the facility staff in the RP Department and the augmentation of the facility staff with two additional Radwaste Decontamination Technicians. Well qualified contractor personnel were obtained to augment the staff during the refueling outage. Staffing levels of licensee personnel and temporary contractor technicians were appropriate during the assessment period, which included periods of both routine operations and refueling activities.

Licensee site and corporate audits of the program were comprehensive and licensee management was responsive to audit findings. An exception to this was noted during reviews of counting room data, which contained several air sample results that had been approved by first line management without the required analysis having been completed or with gross calculation errors. With the noted exceptions, management oversight of the RP program was comprehensive and effective.

The licensee made several programmatic and material improvements in the RP Program during this assessment period. Program improvements included fully implementing an effective "hot particle" control program, establishing a Vapor Container RP Control Point, and initiating a plant ALARA Committee. Material and equipment improvements included a steam generator mock-up, arm and elbow contamination monitors, automatic laundry monitors, locking gates for some of the moat access areas, and shield plugs for the steam generator manways. The licensee also used a strippable paint to decontaminate the shield tank cavity (STC). The use of the strippable paint resulted in a dose reduction and a minimization of radioactive waste for the STC work.

The licensee corrected several of the ALARA program weaknesses which were identified during the previous assessment period. Improvements were made in the areas of exposure tracking of radiologically significant job evolutions (previously, exposure tracking was only performed for steam generator work), reviewing ALARA work packages, establishing an ALARA logbook to improve both ongoing job evaluations and post job reviews, and ensuring that adequate training is given to the personnel responsible for ALARA practices. Management support and commitment to ALARA appeared good but the licensee had not developed a method to set challenging and realistic ALARA goals. The total exposure for 1988 was 227 man-rem, which was 17% over the 1988 goal. It appeared that the main reason the licensee did not meet its ALARA goal was the ALARA planners were not aware of the scope of work anticipated for the year when setting the annual ALARA goal. Further ALARA program improvements could be made in the areas of minimizing unnecessary exposures and estimating man-hours for specific tasks. Although minor administrative ALARA program improvements still need to be made, the licensee has implemented many improvements which have resulted in a stronger RP program.

The licensee continued to demonstrate a weakness in the area of posting and controlling access to areas for RP purposes. Two violations in the RP area were identified. One of the violations involved a failure to properly post a High Radiation Area and the other involved a failure to follow RP Procedures. These types of weaknesses were also identified in the previous assessment period. Deficiencies were noted by the NRC in the proper posting of an Airborne Radioactivity Area and a High Radiation Area, and in worker compliance with RP postings. Additionally, the licensee identified a High Radiation Exclusion Area (HREA) door which was open and unattended due to a failure of the locking mechanism. Licensee corrective actions were weak in that they did not address a Technical Specification requirement that continuous surveillance of the door be provided (a surveillance every 1/2 hour was performed), even though the licensee knew that the locking mechanism could be defeated. In addition, due to a lack of communication and a breakdown in work control, a failed locking mechanism on this HREA door existed for a period of seven months and could have prevented exit. Although the licensee's initial assessment of this condition was weak, they were later responsive to NRC concerns. In response to this issue, RP supervision is now required to review maintenance requests to assess pending work. A maintenance request logbook is utilized to track work and a stop work policy has been implemented.

Radiological Effluent Control and Monitoring

One inspection of the licensee's radioactive effluent control program was conducted near the end of the assessment period. The licensee consistently met Technical Specification requirements with respect to effluent sampling, sampling frequency, analysis, surveillance, and reporting requirements. Effluent and process monitors were calibrated in accordance with the Technical Specification requirements and calibration procedures for these monitors were found to be of good quality with respect to all surveillance requirements. Air cleaning systems were reviewed by NRC inspectors who found that required surveillances had been performed. Overall, the effluent control program was evaluated as good.

The Radiological Environmental Monitoring Program (REMP) was reviewed late in the assessment period. The review included licensee audits, QA/QC of the analytical laboratory, comparison of the collocated TLD monitoring results, and the meteorological monitoring program. The audits were thorough and of excellent technical depth sufficient to identify programmatic problems in the REMP. The monitoring results of the licensee's TLDs collocated with NRC's TLDs were in good agreement. Calibration and preventive maintenance of the meteorological instrumentation were in accordance with all surveillance requirements. The overall evaluation of the REMP was that it is an excellent program.

Early in the assessment period one confirmatory measurement inspection was performed using the NRC:RI Mobile Laboratory. Results of all samples split between the licensee and the NRC were in agreement. The capability of the licensee's whole body counting was also assessed using the NRC:RI Whole Body Counting Phantom. Counting results for lungs and GI tract were in good agreement. A noted strength of the licensee's QA/QC program was the on-going evaluation of the contractor laboratory using split samples. Overall, the NRC found the radiochemical measurements and whole body counting programs to be of high quality.

Transportation

Two routine inspections of the licensee's program for transportation and solid radwaste were conducted, one early and the other late in the assessment period.

The management organization in this area was clearly defined with key positions identified and responsibilities delineated. Excellent QA/QC performance was noted. Training of radwaste workers met the criteria set forth in NRC IE Bulletin 79-19. Procedures were found to be comprehensive in scope and to adequately reflect existing radwaste processing. Shipping records were found to be complete, and to accurately classify the material in accordance with NRC and DOT regulations.

One reactive inspection of the circumstances surrounding waste shipments from the licensee's facilities to the burial site was conducted during the second quarter of the assessment period. External removable contamination levels of shipping casks had exceeded regulations during shipments due to cask "weeping." It was noted that the licensee's procedures were not adequate to ensure that

the maximum allowable contamination levels set forth in 10 CFR 71.87 were not exceeded during transport. The licensee took prompt corrective actions to modify the procedures, require review of the contractor's procedures by the Plant Operations Review Committee prior to implementation, and notify the contractor of changes to the procedures. This cask weeping event was an isolated incident and did not impact the licensee's routine transportation activities.

Overall, the NRC found the transportation and solid radwaste program to be good.

Summary

In summary, management oversight of the RP program was comprehensive and effective. Continued attention to the assessment of radiological incidents, effectiveness of root cause analyses and corrective actions is warranted. The licensee was very responsive to self-identified and NRC concerns throughout the assessment period. The training and qualification program was generally effective. Few significant operational events occurred in this area. Staffing levels of licensee personnel and temporary contractor technicians were appropriate during periods of routine operations and refueling activities. The radiological effluent control and monitoring and transportation programs were considered strong.

III.B.2 Performance Rating: Category 2, Improving.

III.B.3 Recommendations

Licensee: None.

NRC: None.

III.C.1 Maintenance/Surveillance (631 hours, 22%)

III.C.2 Analysis

The maintenance and surveillance functional areas were evaluated in separate sections of previous SALP reports. This section has been created to consolidate the two sections and to assess all activities associated with diagnostic, predictive, preventive or corrective maintenance of plant structures, systems and components. It evaluates procurement, control and storage of components including qualification controls, installation of plant modifications, and maintenance of the plant physical condition It also includes surveillance testing as well as Inservice Inspection and Testing activities.

In the previous SALP, maintenance was rated an improving Category 2, and surveillance was rated a Category 1. Maintenance weaknesses included personnel error combined with inadequate review practices for activities impacting operating systems and a need to improve the effectiveness of programs for plant modification and maintenance. Other weaknesses were noted in the supervision of work activities, the adequacy of engineering support, dedication of commercial grade equipment, and the timeliness of developing a program for the control of technical manuals. Training was characterized as being ineffective in supporting program implementation. Positive steps taken to upgrade the maintenance program and improve its effectiveness were the implementation of a management observation program, and revision of the maintenance request and post-maintenance testing procedures.

In the previous SALP, surveillance was considered a strong functional area. No reactor trips or significant personnel errors were caused by surveillance tests. Weaknesses identified included surveillance procedures not reflecting TS requirements, personnel error resulting in missed TS required surveillances, and inadequate quality verification for steam generator eddy current testing. Program strengths included the coordination of surveillances with operations personnel, on-the-job training, and positive personnel attitudes.

The evaluation for this assessment period is based on routine resident and specialist inspections. During the assessment period, the core XX refueling was completed in approximately nine weeks. No team inspections were performed.

Maintenance and surveillance management positions remained fully staffed with personnel who consistently demonstrated technical expertise and a proper safety perspective. A conservative approach was observed in planning-level decision making. The licensee planning efforts provided for effective coordination of daily activities during the outage and in support of plant operation. Management was generally effective in initiating enhancement and upgrades to address programmatic weaknesses. Senior management was routinely observed assessing work activities. Engineering support to maintenance was effective, and is discussed in the Engineering/Technical Support section of this report.

Physics testing performed during startups was closely coordinated with reactor engineering, operations, instrumentation and controls, and maintenance personnel. Precritical checks, control rod testing, reactivity data trending, incore flux mapping, and calorimetric determinations were performed well. Personnel interaction in this area was considered a licensee strength. An exception to this performance standard was the inadequate detail provided in documentation of containment integrated leak rate test results.

Feedback from quality assurance and quality control activities was generally effective in providing critical self-assessment to improve work activities. However, quality verification observations or recommendations occasionally did not receive appropriate attention by the line organization. For example, early in the assessment period quality control personnel identified a concern about a possible boron buildup around a chemical and volume control system motor-operated valve. Because of untimely followup by the operating organization, a second equipment malfunction occurred.

Inservice Inspection deficiencies identified in the previous SALP were adequately addressed. Inservice Testing was considered effective.

During this assessment period, the licensee continued to expand initiatives in training. In addition to assisting the maintenance department in conducting training on newly implemented procedures, the training staff became more involved with inplant evolutions. Critical outage training and qualification programs were effectively scheduled. Personnel demonstrated a sound understanding of the maintenance request and post-maintenance test procedures. Personnel consistently obtained the required approvals and tagouts. Surveillance testing was effective in identifying equipment needing maintenance. Maintenance requests were consistently issued when required and were generally well prioritized. However, occasionally unclear characterization of deficiencies resulted in untimely resolution. The licensee was effective in correcting the root cause in each case.

Personnel consistently demonstrated a safety perspective in conducting maintenance and surveillance activities. Operational events seldom occurred as a result of maintenance and surveillance activities. Those that did occur resulted from personnel inattention to procedural guidance or insufficient technical review. Three LERs were reported as a result of personnel error which impacted normal plant operations. Two examples of instrumentation and control personnel failure to adhere to station procedures were identified as one violation. The first example involved a manual reactor scram from full power that was initiated when a personnel error resulted in the inadvertent engineered safety feature closure of the main steam line nonreturn valves. The second was an improper restoration following surveillance testing which rendered the control room emergency air cleaning system inoperable. Additionally, the independent restoration verification failed to identify the error. Improvements were noted in the level of supervisory involvement in planning and review of field activities. However, further improvements in this area are warranted as evidenced by an inadequately reviewed temporary change request which resulted in the deenergization of an emergency electrical bus and some control room indication

systems. The licensee was effective in implementing immediate corrective actions and actions to prevent recurrence. The personnel errors were isolated in nature and were not indicative of programmatic weaknesses or deficiencies in training. Strong individual performance was usually observed.

Five licensee event reports occurred as a result of equipment failures or degraded equipment performance. These included LERs for a sticking nuclear instrumentation channel relay, pressurizer safety valve setpoint drift, and reactor protection system bistable setpoint drift. NRC review of these events identified the need for improved predictive maintenance trending.

The licensee upgraded surveillance and maintenance procedures on an ongoing basis. When weaknesses were identified, appropriate improvements were made. Areas which clearly demonstrated this strength included procedures for hydrostatic testing. The licensee was aggressive in addressing procedures and the associated lineup drawings to effectively qualify systems.

In summary, the licensee was generally effective in addressing issues identified in the previous SALP. Some personnel errors continued. However, a consistently higher level of quality of maintenance and maintenance oversight was observed. The surveillance program continued to be a licensee strength. Management was aggressive in upgrading plant equipment and developing programs to enhance long term equipment reliability to support safe plant operation. Maintenance and surveillance personnel demonstrated a high level of pride and ownership in the quality and results of their work.

III.C.3 Performance Rating: Category 1

III.C.4 Recommendations

Licensee: None.

NRC: None.

III.D Emergency Preparedness (214 hours, 8%)

III.D.1 Analysis

During the previous assessment period, license performance in this area was rated Category 2. A partial-participation exercise had disclosed potential deficiencies in Emergency Action Levels (EALs). Also, a number of weaknesses relating to emergency response facilities and dose assessment capabilities had been identified during an Emergency Response Facilities (ERF) Appraisal.

During the current assessment period, one full participation exercise was observed, one routine inspection was conducted and changes to the emergency planned and procedures were reviewed.

During the full-participaton exercise on April 26-27, 1988, the licensee demonstrated very effective implementation of their emergency plan and implementing procedures. The activation and augmentation of the emergency response organization (ERO) and the activation, staffing and use of the ERF's were noted strengths. Emergency notifications and the general use of the plan and implementing procedures were also very good. Effective use of revised EALs demonstrated both EAL consistency with NUREG 0654 guidance and improved training in event classification.

The results of the routine inspection performed at the end of the assessment period indicated a significant overall improvement in the emergency preparedness (EP) program. Most notable were improvements in the areas of training, management oversight and control, and independent audit quality. There were no violations or significant weakness identified in the emergency preparedness area during this assessment period.

During the assessment period, personnel assignments of both the onsite EP coordinator and the individual in charge of corporate support for the Yankee EP program (Manager - YNSD Emergency Preparedness Group) changed. Both of these positions were promptly filled to maintain program continuity. YNSD retained responsibilities which were integral to the onsite EP program as well as its function of providing additional expertise and consultation for onsite needs. Both of the newly appointed individuals are experienced and have a genuine interest in maintaining a strong program. Both are cognizant of past NRC concerns with regard to the site/corporate interface and are taking steps to delineate areas of responsibility and formalize the control of EP program administrative functions. These actions were intended to preclude future problems by emphasizing accountability. Upper management at both the site and corporate levels was aware of and provided good support for efforts to maintain the program.

The licensee has generated a detailed document to present current EP program status. This document included up-to-date information on corrective actions being taken in response to known problem areas and will be updated periodically. The licensee's recognition of the evolving nature of EP prompted their

decision to generate this document. In addition to providing a point of reference for program status, the initial issue of this document (dated July 1989) indicated significant progress in the licensee's response to NRC concerns as well as problem areas identified through self-critiques and the annual independent audit.

The 1989 independent audit report was thorough, comprehensive and a notably better product than previous reports. Since the audit was performed by the same department within YNSD that conducted the previous audits, it is apparent that the licensee had made improvements in the areas of audit planning and audit comprehensiveness in response to previous NRC comments.

The licensee has taken an integrated approach to addressing the deviation noted during the 1987 ERF Appraisal regarding parameters for post-accident monitoring per Regulatory Guide 1.97. After a detailed evaluation, the licensee decided to add several additional Regulatory Guide 1.97 parameters to the Safety Parameter Display System. The changes will be made during the next fuel cycle. In addition, the licensee demonstrated initiative by scheduling improvements to the control room closed circuit television system to further improve data transmission to ERF's outside the control room.

The licensee responded favorably to an NRC request to supplement communications with the NRC by use of the new Region I Incident Response Center data handling systems. The licensee plans to implement the new communications link during the next annual emergency exercise scheduled for November 28, 1989.

The EP training program continued to improve. During the previous assessment period, the EP training staff was reorganized. Their primary focus was to rewrite all the EP lesson plans subsequent to an overall rewrite of the plan and procedures and to retrain the entire ERO to those new lesson plans. During this assessment period, the licensee developed requalification lesson plans, position objectives for each ERO position, and performance-based training which verifies ERO staff performance by use of hands-on mini-scenarios. Comprehensive ERO qualification information was maintained on a newly developed, computerized database.

The licensee's relationship with offsite agencies remained good. Regular meetings were held with the Massachusetts Civil Defense Agency (MCDA) and the State of Vermont to discuss offsite issues including planning and exercise preparations. The licensee also worked with both MCDA and the State of Vermont in developing and conducting training for state and local emergency response personnel.

In summary, the licensee improved the quality of its emergency plan, procedures and facilities and was responsive to NRC concerns expressed in the previous SALP. The licensee made further improvements in EP training, audit quality and management oversight and control and has established a strong program in support of onsite and offsite emergency preparedness.

III.D.2 Performance Rating: Category 1

III.D.3 Recommendations

Licensee: None.

NRC: None.

III.E Security (186 hours, 6%)

III.E.1 Analysis

During the previous assessment period, the licensee's performance was rated Category 2, Improving. The Category 2 rating was largely based upon management's inattention to implementation of the physical security plan (the Plan). The licensee's performance resulted in four violations and the imposition of a civil penalty.

During this assessment period, three routine unannounced physical security inspections were performed by region-based inspectors. One minor violation was identified. Routine inspections by the resident inspectors continued throughout the period.

The increased plant and corporate management support for the security program that was noted late in the last assessment period continued during this assessment period. To establish a more effective program, the licensee continued to upgrade both the physical security and the management elements of the program. The interest in and attention to the program by the Security Manager, who was appointed by the licensee in January 1988, remained evident during this period. His nuclear security knowledge and expertise is apparent in his efforts to implement a performance-based program. Security management organization changes (i.e., establishment of proprietary shift supervisors to oversee contractor performance on each shift and proprietary supervisors for major program elements) were fully implemented and staffed during this assessment period. These actions appear to have had their desired effect as evidenced by a more cohesive and orderly program implementation.

During this assessment period, the licensee also established a comprehensive preventive maintenance (PM) program for security systems and equipment. The increased maintenance support for security equipment that was noted during the last assessment period continued during this period. This increased support has reduced the use of compensatory measures and overtime, and has substantially reduced downtime for security equipment. However, aggressive PM and effective maintenance support programs have not eliminated the need to upgrade certain equipment that is degrading due to age. The licensee upgraded the protected area (PA) assessment aids and search equipment during this period to state-of-the-art equipment that is very effective. Other equipment and systems need to be similarly upgraded to preclude problems in the future. The licensee is aware of that need, and action to replace that equipment should continue to be a high priority.

The licensee continued to be significantly involved with the security force contractor and security force personnel staffing and performance related issues. Improvements in security force performance, training, staffing and morale that were noted during the last assessment period continued during this period. Additionally, the licensee employed a new security force contractor

during this assessment period. This was done in an effort to improve the professionalism of the security force. The transition between contractors occurred smoothly, which is indicative of good planning and management involvement in the program. Since the transition (September 1988), about 35% of the security force has been replaced by the new contractor with more aggressive personnel in another effort to improve the performance and professionalism of the security force.

During this period, the licensee also successfully resolved the remaining findings from the NRC's Regulatory Effectiveness Review (RER), conducted in mid-1986. The resolution of the RER findings demonstrated a thorough understanding of NRC security performance objectives and responsiveness to NRC concerns.

Both senior plant operations and security management continued to be aggressively involved in the security program at Yankee Rowe. This was demonstrated by the licensee's attention to upgrading equipment, formally analyzing security program data, increasing benefits for the security force, and upgrading security force response gear and weapons.

The Security Manager and his staff were dedicated security professionals who were vested with the necessary authority and discretion to ensure that the program was carried out effectively and were actively supported by their management. The security program was also actively supported by other plant functional groups and effective communication channels existed between security (both licensee and contractor) and other plant groups, as evidenced by a lack of interface problems on site.

Security management continued to actively participate in the NRC Region I Nuclear Security Association and in other groups engaged in nuclear plant security matters. In addition, they actively interfaced with law enforcement agencies to maintain good working relationships.

Staffing of the contract security force was consistent with program needs as evidenced by the limited use of overtime. The contractor also exercised adequate oversight as demonstrated by few personnel errors attributable to the security force. The licensee continued to hire contract security force personnel to fill openings in the its proprietary organization, thereby providing a career employment ladder for members of the contract force.

The training and requalification program is currently being expanded. The program was administered by a full-time proprietary training supervisor; this individual recently left the licensee's employ. The licensee is actively recruiting a qualified individual for this vacancy. Existing proprietary security personnel are carrying out the training until a new training supervisor is hired. Proprietary shift supervisors were also utilized, on a part-time basis, to assist in the training efforts. Training facilities are located on site but are not extensive. Management attention is necessary to ensure that a proper training environment and adequate training aids are provided. In an effort to upgrade the firearms training program, the licensee built a new firearms range

on site to facilitate training and requalification. The licensee has also begun to provide resources for special, off-site training courses for proprietary personnel. This specialized training should be continued in order to upgrade the program and to enhance the expertise of the new supervisors. Contingency drills were beginning to be conducted on a regular basis on back shifts, and were being effectively used for training purposes by conducting critiques that are fed back into the formal training and requalification program. Additionally, the licensee's operations organization is actively participating in more of these exercises to promote better interface and coordination between the groups. This practice should be continued and expanded.

The licensee's event reporting procedure was found to be clear and consistent with the NRC's reporting requirements in 10 CFR 73.71. Five event reports were submitted to the NRC during the assessment period. Of the five events, two were attributable to security personnel performance problems: one incident of sleeping on-duty and one incident of allowing an unauthorized person into a vital area. The remaining three events were: one improperly transmitted safeguards document; a potential for improperly conducted background investigations by a contractor (although the investigations were subsequently found to be adequate); and a demonstration with arrests of protestors at the station. All of the events were properly followed up and compensatory measures were implemented when required.

During the assessment period, the licensee submitted three security plan changes and one training and qualification plan change in accordance with the provisions of 10 CFR 50.54(p). The proposed changes were generally clear and well-documented and the licensee was very responsive in providing amplifying information when requested by the NRC. This is indicative of a good working knowledge of the security program by licensee security personnel responsible for preparing and submitting the changes.

During this assessment period, the NRC identified several potential concerns with vital area (VA) and access controlled area (ACA) barriers, PA detection aids, security force suitability records, access authorization levels, alarm station communications, etc. The licensee was very responsive to those concerns and aggressively pursued corrective actions. This is evidence of the licensee's desire to implement an effective security program. However, while the licensee was responsive to the NRC identified concerns, these types of concerns should have been identified during the licensee's annual security program audit. The licensee's audit covered all aspects of the security program, but did not identify the potential concerns because the audit team lacked specific expertise in those areas where the NRC identified the concerns. The licensee's audit team should include personnel with nuclear security expertise to improve the audit program and make it more effective.

In summary, the licensee is implementing an effective security program. Significant program improvements and enhancements were made during this assessment period and management attention to and interest in the program is very evident. Supervision of the program remained very strong and effective. However, program effectiveness could be further enhanced through additional technical and

supervisory training for proprietary personnel, upgrading/replacement of aging equipment, improving training facilities for the security force, and ensuring nuclear security expertise on audit and assessment teams.

III.E.2 Performance Rating: Category 1

III.E.3 Recommendations

Licensee: None.

NRC: None.

III.F Engineering/Technical Support (139 hours, 5%)

III.F.1 Analysis

During the previous SALP period, Engineering and Technical Support was rated as Category 1. The engineering activities related to the design change process were noted to be well managed, procedurally controlled and staffed by a stable and knowledgeable group. The licensee had taken on an aggressive configuration control initiative to better document and control the plant design bases. The licensee had a proper safety perspective which was reflected in the quality of the design change packages, and the low amount of rework. Minor weaknesses existed in the documentation of the basis for 10 CFR 50.59 safety reviews and the occasional lack of timeliness in problem resolution.

The conduct of 10 CFR 50.59 safety reviews improved during the assessment period. The revision of AP-0200, Plant Modifications, has been effective in providing better guidance in the performance of these reviews. Indepth analysis of problems and the associated corrective actions were provided in the safety analysis. The individuals performing these activities are experienced, trained and dedicated.

A design package for replacement of the Number 3 emergency battery furnished by the Yankee Nuclear Services Division (YNSD) for review was complete and considered the needs of the plant. This effort demonstrated good engineering and a good safety perspective. Consideration was given to seismic design requirements in that the emergency lighting was seismically qualified, and an electric space heater not seismically qualified was moved to a location away from the battery. In addition, a fence was placed adjacent to the batteries to protect them from inadvertent damage when maintenance was performed on the battery charger.

Onsite engineering by the Maintenance Support Department (MSD) was effective in providing sound and technical resolution for safety significant evolutions, surveillances and maintenance. The licensee showed a clear understanding of safety issues for maintenance involving reduced reactor coolant system inventory (mid-loop operations). Programmatic and physical controls were implemented in a detailed and thorough manner. Timely engineering support and surveillance was conducted to assess pressurizer surge line performance during thermal transient conditions. One exception to this level of performance was the lack of an engineering evaluation prior to resumption of the previous power level following an extraction steam piping water hammer incident. During the outage, the licensee effectively enhanced the onsite engineering support group with personnel from the YNSD technical staff.

YNSD provided ongoing support in resolving equipment problems and conducting failure analyses. Noteworthy efforts were the identification and replacement of defective main steam line pressure switches and main coolant system loop isolation valve discs. Maintenance organization implementation of YNSD design packages are generally good. One exception was that the NRC identified missing fasteners for the safe shutdown system batteries. Late in the assessment

period, the licensee introduced a rotational engineering support program designed to provide YNSD expertise to analyze systems, procedures, and technical manuals. Additionally, the licensee dedicated significant personnel and analysis resources to examine equipment aging and upgrades necessary for plant life extension (PLEX).

YNSD project engineers were required to oversee installation of modifications that they designed. This created an effective interface between engineers at the site and at the corporate office. Communications between various onsite and offsite organizations appeared to be good. In addition to active involvement during outages, the licensee developed a program for assigning one engineer from the corporate office to the plant on a weekly basis. The assignments are rotated through the engineering office so that one engineer is always assigned to the plant. A post outage Lessons Learned Workshop was held to assess the performance of all parties. This workshop included engineering, expediting, construction, and interfaces between project management, design, and contractors. This workshop was a good initiative on the part of the licensee to improve the management of outages and demonstrated good communications between the line organizations and corporate engineering.

The organization of engineering services (YNSD) into Projects, each responsible for service to a specific plant, provided continuity of engineering service to the plants. Each Projects group was organized by engineering discipline and was observed to be well staffed with experienced and knowledgeable engineers. The low turnover of engineering talent assures continuity of the services provided to the plants and reduced the training required to maintain proficiency in the YAEC methods.

In general, licensing submittals to the NRC were found to be timely and well organized. The licensee's submittals were complete and well developed. The safety considerations and significant hazards considerations were especially comprehensive, technically sound and of high quality. No formal requests for additional information were required for these reviews. In particular, the licensee's Technical Specification change request regarding the Incore Detection System was of very high quality. It was technically sound and provided good justification for the licensee's position. The analysis was thorough and the presentation of the methodology and data was exceptional. In addition, a review of the licensee's submittal in conjunction with the transport of heavy loads over the Spent Fuel Pit was performed. The staff found that the submittal showed a good understanding of NRC concerns and was in full compliance with NUREG-0612.

During the assessment period, the licensee proposed several modifications to the ECCS evaluation model for the station. All models were found acceptable. However, it appeared that minimal effort was expended by the licensee to justify the model and, thus, further experimental benchmarks were required. In addition, the licensee initially failed to account for certain rod bundle geometry differences between tests used for the model determination and the Yankee fuel rods. The licensee quickly and effectively responded to these concerns

when they were raised by the NRC staff. Overall, it appeared that the licensee had adequate technical capability, but in attempting to minimize the efforts, initially omitted important modeling information.

Licensee management actively supports participation in industry related groups and societies to assure the company kept is abreast of the latest information. In 1989 there was a commitment of approximately five man years of effort to programs sponsored by organizations such as IEEE, Owners Groups, NUMARC, ASME, and other national and local professional societies.

Yankee Nuclear Power Station is the lead PWR plant in a joint program with the Electric Power Research Institute (EPRI) and the Department of Energy to evaluate plant aging and issues related to plant life extension. The licensee has dedicated significant resources to this plant life extension (PLEX) program to verify and maintain plant configuration control. This initiative demonstrates the licensee's commitment to the study of plant safety, aging and configuration control.

Although the QA group performed independent surveillance of selected design changes and plant modifications activities, the NRC noted that QA/QC overview of the design changes and plant modifications was limited in scope. However, the cognizant engineers provided ample coverage to verify that the modifications and installation were adequately implemented in accordance with the approved procedures and instructions and an acceptable level of quality was achieved.

Management involvement in this functional area was generally strong. One exception was the NRC identification of a violation concerning the failure to establish measures that would ensure the proper management of significant conditions adverse to quality involving design deficiencies. This item was identified by NRC in reviewing licensee modifications to upgrade electrical coordination. Licensee management took appropriate and timely measures to develop a satisfactory corrective action system to address design deficiencies once the need was identified by the NRC.

In summary the licensee's engineering department has continued to provide good support to the plant. The weaknesses noted in the previous SALP concerning 10 CFR 50.59 and timeliness problems were corrected during this SALP period. Management involvement in implementing design changes and plant modifications was adequate. The onsite Maintenance Support Department (MSD) and the YNSD exhibited good morale with qualified personnel and a stable work force. The quality of work performed by both organizations was good. There appeared to be an emphasis on maintaining a strong interface between MSD and YNSD.

III.F.2 Performance Rating: Category 1

III.F.3 Recommendations

Licensee: None.

NRC: None.

III.G Safety Assessment/Quality Verification (185 hours, 6%)

III.G.1 Analysis

In previous SALP reports, Assurance of Quality and Licensing Activities were evaluated in separate sections of the report. This new section (Safety Assessment/Quality Verification) has been created not only to consolidate those two sections but also to encompass activities such as safety reviews, responses to NRC-generated initiatives such as generic letters, bulletins, information notices, and resolution of TMI items, and to provide a broad assessment of the licensee's ability to identify and correct problems related to nuclear safety. This includes the effectiveness of the licensee's quality verification function in identifying and correcting substandard or anomalous performance and in monitoring the overall performance of the plant.

This constitutes the first assessment of this functional area. For the two previous SALP reports both Assurance of Quality and Licensing Activities were rated Category 1.

This assessment is based on (1) interactions with the licensee in the course of normal processing of safety-related licensing actions, such as issuance of license amendments and implementation of NRC Safety Bulletins and Generic Letters; and (2) normal inspections of QA activities, plant operations, observations of committee activities, and interaction with licensee management. (See the previous section of this report on Plant Operations relative to committee activities.)

As a demonstration of the licensee's commitment to safety, the licensee has recently budgeted funds for a plant-specific simulator in lieu of requesting an exemption. This will result in enhanced training capabilities for operations personnel and better preparation for emergency preparedness exercises. The licensee has completely rewritten the Emergency Operating Procedures, that follow the Westinghouse guidelines, and has implemented these new procedures.

The licensee has been improving and adding to engineered safety features (ESF) equipment. Emergency power systems have been improved during this SALP period, and feedwater systems have been enhanced by plant modifications. During the next refueling outage, the licensee intends to make the new Nuclear Instrumentation System operational. The licensee is upgrading the existing Probabilistic Risk Assessment (PRA) to include external events. Yankee has essentially completed plant modifications related to the seismic upgrade program during this SALP period as part of the Systematic Evaluation Program (SEP). The Yankee organization during this period has initiated a 20 man-year per year program in regard to further evaluating plant aging as part of their plant life extension (PLEX) program. While aging is the major activity in PLEX, other safety related reviews continue to be conducted which will benefit ongoing plant operations. These resource commitments demonstrate the licensee's desire to continue safe plant operations.

During this SALP period: (a) the licensee came into compliance with the ATWS rule 10 CFR 50.62; (b) Yankee applied for and received an administrative license extension to exclude the construction period from the 40 year license period -- this action required submittal of environmental and safety information that docketed enhanced information in these areas; (c) the in-core detection system was modified and improved; (d) a license amendment was issued improving first level undervoltage protection; (e) a cask drop analysis was approved for fuel pool area; (f) a new steam cooling model for large break LOCAs was approved by NRC; (g) NRC issued a license amendment permitting increase in nitrogen pressure in safety injection accumulator, improving this ESF; (h) Yankee was in the process of adding an enhanced primary water clean-up system; (i) the small-break LOCA review was concluded; and (j) the licensee completed an overall LOCA model-FLECHT correlation. All of these licensing actions are activities that demonstrate licensee initiatives to improve ESFs and to meet NRC regulations. There were no rejected license amendment submittals during this SALP interval. The submittals were complete, of high technical quality, and well organized.

The licensee's conduct of safety analyses related to 10 CFR 50.59 reviews of design changes and plant modifications improved since the NRC Safety Assessment Team inspection conducted during the last SALP period. There was ample interface between the engineers at the site and at the corporate office, as evidenced by the availability of these personnel at the site during modification activities. The NRC review, in every case, found these analyses to be complete and acceptable.

Nuclear safety-related materials and equipment were procured from approved vendors. The licensee's Commercial Grade Items Procurement program implementation was also adequate. Review and evaluation for dedication of commercial grade items for safety-related application were performed in accordance with approved procedures.

In the past, management had not been aggressive in addressing the update of vendor manuals and information, in that the licensee had not incorporated vendor manual information changes as required by Generic Letter 83-28. Late in the assessment period, these concerns were acknowledged by the licensee and appropriate corrective actions were identified as detailed in a YAEC letter to NRC dated July 21, 1989 and were incorporated into a plant procedure. Continued management attention is warranted to assure that this protracted issue is resolved by the timely completion of licensee commitments. In the Plant Operations functional area of the previous SALP report, it was noted that the licensee had ambiguities and inconsistencies in the TS. The NRC recommended that the licensee improve their TS in this regard. The licensee has since resolved one of these four NRC-identified items through an internal TS clarification and has the remaining items, which are of low safety significance, among the items in their data base of TS improvement plans.

The Yankee independent offsite review committee is titled the nuclear safety and audit review committee (NSARC). Review of the meeting minutes indicated the committee discharged its duties in accordance with the requirements of Technical Specifications. The committee displayed a conservative safety approach toward potential plant aging related problems.

As discussed in the Plant Operations functional area, the NRC concluded that the licensee was providing appropriate management oversight to encourage the identification and ensure the resolution of potential safety issues. In general, the licensee organization demonstrated a good ability to assess incidents, determine root cause, and prescribe appropriate corrective actions. An exception to this good performance was observed in the area of radiological controls. Although improvements in assessments of incidents and identification of effective corrective actions have occurred during this assessment period, continued attention is warranted.

The quality assurance department (QAD) has responsibility for all QA/QC activities. Performance based audits and surveillances of plant activities were performed by the Quality Audit Group (QAG) and the Quality Services Group (QSG) of QAD. The QAD audit and surveillance program moved from a compliance oriented organization to a proactive organization more capable of identifying and preventing potential conditions adverse to safety. The QAD audit and surveillance inspections provided in-depth reviews which effectively developed deficiency and observation detail. The reports assessed and trended present performance and addressed the implementation of corrective actions to previous issues. The plant staff appeared responsive to QAD findings and generally met established commitment dates for resolution. The NRC, through its inspection and reviews of the licensee self-assessment capabilities, found the programs to be very effective.

The licensee maintained a proactive role in industry activities concerning vendor problems through membership in NUMARC Nuclear Plant Equipment Procurement (NPEP) working group and chairmanship of the Nuclear Procurement Issues Council (NUPIC). NPEP is presently working to establish industry positions on substandard/fraudulent vendor issues and to develop a response to the NRC Advanced Notice of Proposed Rulemaking concerning regulations to enhance material acceptance procedures.

YAEC issued Vendor Audit Guidelines for Technical Specialists. These guidelines provided engineers with the information required to ensure effective vendor QA program implementation audits. All YAEC QA audit and surveillance personnel have participated in a "Performance-Based Inspection" training course. This course is similar to that given to NRC inspection personnel.

The licensee initiated a new QA trend program which evaluates individual verification activities (QA audits/surveillance, QC inspections, NRC inspections) and self-identified conditions for recurring quality problems and causally-linked events. The new approach uses QA management evaluation to arrive at conclusions and recommendations for plant, engineering and QA actions.

The in-plant audit program relies heavily on the use of technical specialists enlisted from YNSD and other nuclear plants. As indicated in the Security functional area, security expertise is lacking in the audit program. In 1988, twenty-four technical specialists were used in conducting nineteen in-plant audits. In addition, QAD performs a special audit of the status of corrective actions of industry findings to ensure satisfactory completion based on evidence available. Summaries of audit findings and an assessment of the effectiveness of the functional programs audited are submitted to the YAEC president and vice presidents.

YAEC uses a management feedback system to identify performance weaknesses. On a semi-annual basis, the Yankee Nuclear Power Station staff evaluates the performance of YNSD. Responses and required actions by these departments to upgrade their performance are tracked by a YNSD Performance Evaluation Matrix. Likewise, a mechanism was established so that the YAEC Project provides positive and negative feedback to each site department. This provides an opportunity for departments to formally air their concerns and take necessary action before these concerns turn into problems. This program is monitored by YAEC management.

The licensee improved their internal information review network, and incorporated important plant specific items into surveillance and inspection programs, from NRC Safety Bulletins and Information Notices, INPO Network messages, and USNRC notices of violations.

The initiatives, discussed above, added to an already effective Quality Assurance Program, and demonstrate that the licensee continues to aggressively seek performance improvements in this area.

In summary, the licensee has continued aggressive programs to improve operational safety. In regard to licensee self-assessment capability and quality assurance program implementation, it is concluded that the licensee is a strong performer. The review of operational data, licensee event reports, QA audit reports and inspection reports during this SALP interval demonstrates that the licensee continues to be capable of identifying and effectively correcting deficiencies. However, continued attention in the radiological controls area is warranted. No indications of programmatic breakdowns or declining performance trends in the areas of Safety Assessment or Quality Verification were identified.

III.G.2 Performance Rating: Category 1

III.G.3 Recommendations

Licensee: None.

NRC: None.

## REFERENCE INFORMATION

### A. CRITERIA

Licensee performance was assessed in areas significant to nuclear safety and/or the environment. The following were evaluated, as applicable.

1. Assurance of quality, including management involvement and control.
2. Approach to the resolution of technical issues from a safety standpoint.
3. Responsiveness to NRC initiatives.
4. Enforcement history.
5. Operational events (including response to analyses of, report of, and corrective actions for).
6. Staffing (including management).
7. Effectiveness of training and qualification.

Each functional area was rated as being one of the following.

1. 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 personnel performance is being achieved. Reduced NRC attention may be appropriate.

2. Category 2. Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities is 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.

3. 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 minimum regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

The SALP Board also assessed the licensee's performance to determine a trend for each functional area. The SALP trend categories are as follows:

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

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

A trend is assigned only when, in the opinion of the SALP Board, the trend is significant enough to be considered indicative of a likely change in the performance category in the near future. For example, a classification of "Category 2, Improving" indicates the clear potential for "Category 1" performance in the next SALP period.

It should be noted that Category 3 performance, the lowest Category, represents acceptable, although minimally adequate, safety performance. If at any time the NRC concluded that a licensee was not achieving an adequate level of safety performance, it would then be incumbent upon NRC to promptly take appropriate action in the interest of public health and safety. Such matters would be dealt with independently from, and on a more urgent schedule than, the SALP process.

It should be noted that the industry continues to be subject to rising performance expectations. For example, NRC expects licensees to actively use industry-wide and plant-specific operating experience to effect performance improvements. Thus, a licensee's safety performance would be expected to show improvement over the years in order to maintain consistent SALP ratings.

B. Licensee Activities

The facility was operating at full power at the beginning of the period. Full power operations continued until April 7, 1988, when the plant entered Mode 2 (startup Mode) to perform a main coolant system leak inspection. The plant returned to full power on April 10, 1988, and operated at this level until April 29, 1988, when a shutdown to Mode 3 (Hot Standby Mode) was initiated to replace station battery No. 3. Full power operation resumed on May 10, 1988. An emergency load reduction and removal of the generator from the grid occurred this same day due to a deteriorated conductor on the No. 3 station service voltage regulator. The plant operated at full power from May 12, 1988 until May 17, 1988, when an automatic reactor trip occurred that was the result of a loss of main generator field excitation. The plant returned to full power on May 21, 1988 and remained essentially at this level until August 12, 1988, when the plant began normal coastdown operations from Cycle XIX.

On September 17, 1988 a plant load reduction to 65% of rated power occurred to perform turbine valve surveillance testing. This was followed by an emergency load reduction in response to water hammer in the extraction steam piping as a result of feedwater heater level control problems. The plant returned to normal coastdown operations on September 18, 1988. From 53% of rated power on November 12, 1988 the plant was shutdown for Cycle XIX-XX refueling Outage.

Mode 5 (Cold shutdown) was achieved on November 14, 1988, and the plant was in Mode 6 (Refueling Mode) on November 21, 1988. The licensee's planned seven-week refueling outage was extended by two weeks principally due to: conducting the outage through a period that included three major holidays, efforts required to recondition two main coolant loop isolation valves, unforeseen repair

work on internal feedwater system components of all four steam generators and post outage equipment performance problems with main turbine throttle valves and hydraulic control system.

On January 11, 1989, the licensee initiated Core XX physics testings and a reactor scram occurred due to electrical noise that generated a false high startup rate signal. Initial criticality was achieved with testing satisfactorily completed on January 13, 1989. The turbine was phased to the grid on January 14, 1989. While removing the main generator from the grid for overspeed trip testing on January 16, 1989, a switchyard oil circuit breaker failed to trip open resulting in the motorization of the turbine generator for a ten minute period. No damage to the turbine generator was identified to have occurred as a result of this condition. Successful completion of the turbine testing and phasing to the grid occurred on January 17, 1989.

During power escalation on January 18, 1989 an unanticipated increase in turbine load occurred due to problems with the governor speed controller. The plant was at full power on January 24, 1989. On February 8, 1989 an emergency load reduction to the startup mode to repair a leaking feedwater control valve occurred. The plant returned to full power operation on February 11, 1989.

Full power operation continued until March 21, 1989 when load was reduced to 80% of rated power for heater drain pump maintenance. The plant returned to full power the same day.

The plant remained at power until April 6, 1989 when a manual reactor scram was initiated following an inadvertent closure of a non-return valve during surveillance testing. The plant returned to full power operation on April 9, 1989. On April 23, 1989, an automatic reactor scram on low main coolant system pressure occurred, which resulted from Group C control rods dropping into the core during maintenance on the control rod drive mechanism cam motor which was not operating normally. An Unusual Event was declared and terminated in response to this event. Following reactor criticality on April 25, 1989, the plant returned to full power operation on April 27, 1989, where the plant remained until May 19, 1989, when plant load was reduced to 50% of rated power in order to perform main condenser tube cleaning. The plant was returned to full power operation on May 23, 1989 and remained stable until June 6, 1989 when an emergency power reduction was performed as a result of an increased main coolant system leakage rate.

The plant was at full power on June 8, 1989 and was maintained at this power level until July 7, 1989, when plant load was reduced to 50% of rated power to replace condenser tube plugs. Full power operation was achieved on July 10, 1989 and remained at 100% at rated power through the end of the assessment period.

On July 25, 1989, the licensee declared an Unusual Event-terminated when an inadequately reviewed maintenance activity resulted in an unanticipated fourteen minute loss of the No. 1 480 Vac emergency bus and associated equipment.

C. Direct Inspection and Review Activities

One NRC senior resident inspector was assigned full time during the assessment period. A resident inspector was assigned to the facility for fourteen and one half months of the assessment period. The total NRC inspection effort for the period was 2891 hours (2168 hours annualized).

During this period, one NRC team inspection was conducted to assess the effectiveness of the annual emergency preparedness exercise (April 26-28, 1988). One reactive inspection was conducted in response to the licensee's identification that procedural inadequacies could have resulted in certain reactor protection system trip functions operating less conservatively than that required by TS. A second reactive inspection was conducted in response to circumstances surrounding the arrival of two waste shipments at Barnwell, South Carolina with external non-fixed radioactive contamination levels in excess of those set forth in 10 CFR 71.87(i).

D. Unplanned Trips, Forced Outages, and Power Reductions

| Date | Power Level | Description | Root Cause | Functional Area |
|---|---|---|---|---|
| 5/10/88 | 100% | Load reduction to 15% of rated power due to overheated conductor on No. 3 2400 Vac station service voltage regulator. | Loose connection due to improper installation by contractor maintenance personnel. | Not assigned. |
| 5/17/88 | 100% | Automatic reactor trip due to loss of generator field excitation. | Random component failure of the field overvoltage protection unit circuit board in the static exciter. | Not assigned. |
| 1/11/89 | 0% | Automatic reactor trip on false high startup rate signal. | Spurious signal due to electrical noise from equipment starting. | Not assigned. |
| 2/8/89 | 100% | Load reduction to the startup mode and turbine generator removed from grid to repair blown valve packing on No. 3 FCV. | Leaking breech block following outage maintenance. | Maintenance/ Surveillance |

| Date | Power Level | Description | Root Cause | Functional Area |
|---|---|---|---|---|
| 4/6/89 | 100% | Manual reactor trip in accordance with plant procedures following inadvertent closure of a main steam nonreturn valve during surveillance testing. | Personnel error, failure to follow procedure. | Maintenance/ Surveillance |
| 4/23/89 | 100% | Automatic reactor trip on low main coolant system (MCS) pressure following drop of Group C control rods. | Component failure, inadvertent rod drop during troubleshooting, cause not determined. | Not assigned. |
| 6/6/89 | 100% | Load reduction to Mode 2 and turbine generator removed from grid in response to increased MCS leakage rate. | Packing leak on charging system letdown isolation valve due to degraded packing. | Not assigned. |

NOTE: The root causes identified in this table are the opinion of the SALP Board based on its analysis of the event; and may, in certain instances, differ from the licensee's description of cause, as provided in LER's or monthly operating reports.

E. Allegations

There were two allegations in this SALP period. One allegation (RI-88-0090) dealt with security force personnel sleeping on the backshifts. The other one (RI-88-0120) dealt with ALARA concerns where workers were instructed to remain in radiation areas after work was completed. NRC followup inspection activities found these allegations to be unsubstantiated.

F. Management Conferences

On April 20, 1988, the licensee met with the NRC at the Region I office to discuss the current status of the licensed operator training program.

On July 14, 1988, a meeting was held at the NRC Region I Office to discuss the previous SALP report findings.

On January 27, 1989, an enforcement conference was held in the NRC Region I office to discuss a TS violation involving reactor protection system trip setpoints being set nonconservatively. As a result of this review, the NRC staff issued a Notice of Violation, dated February 15, 1989, which was classified at

Severity Level III. A civil penalty was not issued in this case because the violation was identified by the licensee and was promptly reported, corrective actions were prompt and extensive, and prior enforcement history has been good.

G. Licensee Event Reports

Table 3 reflects a summary of Licensee Event Reports (LERs) submitted during the SALP period.

The LERs adequately described the major aspects of each event, including component or system failures that contributed to the event and the significant corrective actions taken or planned to prevent recurrence. The reports were thorough, detailed, fairly well written and easy to understand. The narrative sections typically included specific details of the event such as valve identification numbers, model numbers, number of operable redundant systems, the date of completion of repairs, etc., to provide a good understanding of the event. The root causes of the events were identified.

Previous similar occurrences were properly referenced in the LERs as applicable. Although the event information was well organized and complete, a separate heading or title for each section of specific information would lead to a clearer understanding of the event information.

A review of the LERs does not indicate any trend that the plant is subject to recurring problems. The underlying causes of the events were random and did not indicate a problem in uncovering deficiencies and correcting them.

REFERENCE INFORMATION H.

TABLE 1

ENFORCEMENT/SEVERITY LEVEL

| AREA | 1 | 2 | 3 | 4 | 5 | DEV | TOTAL |
|---|---|---|---|---|---|---|---|
| Plant Operations | | | 1 | | | | 1 |
| Radiological Controls | | | | 2 | | | 2 |
| Maintenance/Surveillance | | | | 1 | | | 1 |
| Emergency Preparedness | | | | | | | 0 |
| Security | | | | 1 | | | 1 |
| Engineering/Technical Support | | | | | 1 | | 1 |
| Safety Assessment/Quality Verification | | | | | 1 | | 1 |
| Totals: | 0 | 0 | 1 | 4 | 2 | 0 | 7 |

REFERENCE INFORMATION I.

TABLE 2

INSPECTION HOURS SUMMARY

| Area | Hours | % of Time |
|---|---|---|
| Plant Operations | 1183 | 41 |
| Radiological Controls | 353 | 12 |
| Maintenance/Surveillance | 631 | 22 |
| Emergency Preparedness | 214 | 8 |
| Security | 186 | 6 |
| Engineering/Technical Support | 139 | 5 |
| Safety Assessment/Quality Verification | 185 | 6 |
| Totals: | 2891 | 100 |

REFERENCE INFORMATION J.

TABLE 3

LISTING OF LERs BY FUNCTIONAL AREA

| Area | A | B | C | D | E | X | Totals |
|---|---|---|---|---|---|---|---|
| Plant Operations | 1 | 1 | 1 | 2 | 1 | 1 | 7 |
| Radiological Controls | 1 | 1 | - | - | - | - | 2 |
| Maintenance/Surveillance | 3 | 1 | - | 2 | 5 | - | 11 |
| Emergency Preparedness | - | - | - | - | - | - | -- |
| Security | - | - | - | - | - | - | -- |
| Engneering/Technical Support | - | - | - | - | - | - | -- |
| Safety Asses[illegible]t/Quality Verification | - | - | - | - | - | - | -- |
| Totals: | 5 | 3 | 1 | 4 | 6 | 1 | 20 |

Cause C[illegible]

A - Per[illegible] Error
B - Design, Manufacturing, Construction or Installation Error
C - External Cause
D - Defective Procedure
E - Component Failure
X - Other

* Cause Codes in this table are based on inspector evaluation and may differ from those specified in the LER.

LERs Reviewed: 88-04 to 88-15
89-01 to 89-08

## APPENDIX 1

## SALP BOARD MEMBERSHIP AND ATTENDANCE

SALP Board

Chairman:

S. Collins, Deputy Director, Division of Reactor Projects (DRP)

Members:

J. Johnson, Chief, Projects Branch No. 3, DRP
J. Durr, Acting Director, Division of Reactor Safety (DRS)
J. Joyner, Division Project Manager, Division of Radiation Safety and Safeguards (DRSS)
D. Haverkamp, Chief, Reactor Projects Section 4B, DRP
H. Eichenholz, Senior Resident Inspector
R. Wessman, Director, Project Directorate I-3, Office of Nuclear Reactor Regulation (NRR)
M. Fairtile, Project Manager, NRR

Other Attendees:

M. Markley, Resident Inspector
*W. Lancaster, Physical Security Specialist, DRSS
*E. Sylvester, Physical Security Specialist, DRSS
*R. Loesch, Radiation Specialist, DRSS
*R. Summers, Emergency Response Coodinator, DRSS

*Part-time attendees