ENCLOSURE 2

SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-400/87-24

CAROLINA POWER AND LIGHT COMPANY

SHEARON HARRIS UNIT 1

AUGUST 1, 1986 THROUGH JUNE 30, 1987

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I. INTRODUCTION

A. Purpose and Overview

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 SALP program is supplemental to normal regulatory processes used to determine compliance with NRC rules and regulations. The SALP program is intended to be sufficiently diagnostic to provide a rational basis for allocating NRC resources and to provide meaningful guidance to licensee management to promote quality and safety of plant construction and operation.

An NRC SALP Board, composed of the staff members listed below, met on August 27, 1987, to review the collection of performance observations and data to assess licensee performance in accordance with guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." A summary of the guidance and evaluation criteria is provided in Section II of this report.

This report is the SALP Board's assessment of the licensee's safety performance at Shearon Harris Unit 1 for the period August 1, 1986, through June 30, 1987.

B. SALP Board for Shearon Harris Unit 1

Board Chairman

L. A Reyes, Director, Division of Reactor Projects (DRP), RII

Board Members

C. A. Julian, Chief, Operations Branch, Division of Reactor Safety, RII
W. E. Cline, Chief, Nuclear Materials Safety and Safeguards Branch, Division of Radiation Safety and Safeguards, RII
D. M. Verrelli, Chief, Reactor Projects Branch 1, DRP, RII
E. G. Adensam, Director, Project Directorate II-1, Division of Reactor Projects, NRR
G. F. Maxwell, Senior Resident Inspector, Shearon Harris, DRP, RII

Other Attendees at SALP Board Meeting

P. E. Fredrickson, Chief, Reactor Projects Section 1A, DRP, RII
S. J. Vias, Project Engineer, Reactor Projects Section 1A, DRP, RII
K. D. Landis, Chief, Technical Support Staff (TSS), DRP, RII
P. A. Balmain, Reactor Engineer, TSS, DRP, RII
T. C. MacArthur, Radiation Specialist, TSS, DRP, RII

II. CRITERIA

Licensee performance is assessed in selected functional areas depending on whether the facility has been in the construction, preoperational, or operating phase during the SALP review period. Each functional area represents an area which is normally significant to nuclear safety and the environment and which is a normal programmatic area. Some functional areas may not be assessed because of little or no licensee activity or lack of meaningful NRC observations. Special areas may be added to highlight significant observations.

One or more of the following evaluation criteria was used to assess each functional area; however, the SALP Board is not limited to these criteria and others may have been used where appropriate.

A. Management involvement in assuring quality
B. Approach to the resolution of technical issues from a safety standpoint
C. Responsiveness to NRC initiatives
D. Enforcement history
E. Operational and construction events (including response to, analysis of, and corrective actions for)
F. Staffing (including management)
G. Training and qualification effectiveness

Based upon the SALP Board assessment, each functional area evaluated is classified into one of three performance categories. The definitions of these performance categories are:

Category 1: Reduced NRC attention may be appropriate. Licensee management attention and involvement are aggressive and oriented toward nuclear safety; licensee resources are ample and effectively used such that a high level of performance with respect to operational safety or construction quality is being achieved.

Category 2: NRC attention should be maintained at normal levels. Licensee management attention and involvement are evident and are concerned with nuclear safety; licensee resources are adequate and are reasonably effective such that satisfactory performance with respect to operational safety or construction quality is being achieved.

Category 3: Both NRC and licensee attention should be increased. Licensee management attention or involvement is acceptable and considers nuclear safety, but weaknesses are evident; licensee resources appear to be strained or not effectively used such that minimally satisfactory performance with respect to operational safety or construction quality is being achieved.

The functional area being evaluated may have some attributes that would place the evaluation in Category 1, and others that would place it in

either Category 2 or 3. The final rating for each functional area is a composite of the attributes tempered with the judgment of NRC management as to the significance of individual items.

The SALP Board may also include an appraisal of the performance trend of a functional area. This performance trend will only be used when both a definite trend of performance within the evaluation period is discernible and the Board believes that continuation of the trend may result in a change of performance level. The trend, if used, is defined as:

Improving: Licensee performance was determined to be improving near the close of the assessment period.

Declining: Licensee performance was determined to be declining near the close of the assessment period.

III. SUMMARY OF RESULTS

A. Overall Facility Evaluation

At the beginning of the SALP period, the Harris Plant was in the final phase of preoperational testing and closeout of construction activities. During the assessment period, which was shorter than a regular SALP period, the plant transitioned through fuel load, startup and low power testing and concluded the period in commercial operations. Management attention and involvement contributed significantly to this relatively smooth process. Major strengths were identified in the areas of maintenance, surveillance, fire protection and licensing activities. Major weaknesses were not identified in any functional area.

Harris sustained a large number of secondary plant generated reactor trips, mainly attributed to design problems causing feed and condensate system flow oscillations. Adjustments made to the secondary system, after a comprehensive task force review, resulted in a significant reduction in secondary plant perturbations. The primary system functioned very well during the fairly short duration of plant operations covered by this SALP period. Health physics concerns, either CP&L or NRC originated, have been promptly responded to and corrected. Actual personnel exposures have been consistent with other plants during the initial startup. Assessment of worker exposure, however, was identified as needing improvement. Generally, both the maintenance and surveillance programs were implemented in a very professional manner. A computerized surveillance program, which is being implemented, should ensure timely performance of surveillances. Management was very active and supportive of the fire protection program, which has improved significantly as the plant has gone from construction to operations.

Several weaknesses were noted in the 1986 partial emergency preparedness drill. All weaknesses were addressed and performance definitely improved during the full-scale exercise in 1987. Although performance on both exercises was satisfactory, the scenario for the partial drill had to be revised and the scenario for the full exercise, although improved, did not challenge sufficiently all emergency preparedness elements.

The security program underwent a difficult break-in period. A combination of security computer problems and breaches of security barriers provided challenging problems to be overcome. A Severity Level III violation was issued for the security barrier breach problem. Corrective actions for the security problem were very comprehensive and appear to be quite successful.

Quality assurance surveillance and inspection activities appear

to have made a successful transition from construction to operations. Licensing actions were handled in an aggressive, excellent manner by the licensee. Strong and aggressive management involvement with a competent licensing staff was definitely evident.

Although overall training was satisfactory, problems did occur with operators passing the NRC written exam, but not performing satisfactorily on the simulator. Modifications to the training program, retraining and examination solved this problem. Also weaknesses in the Emergency Operating Procedures were identified and addressed during the SALP period. Training problem solutions have been both prompt and correct.

Several problems occurred toward the end of the preoperational testing program, but were promptly corrected. The startup testing program was conducted very effectively, utilizing lessons learned from the preoperational testing program.

Management awareness of routine site activities continues, as evidenced by their presence during daily plant status meetings, shift turnover briefings and their frequent presence throughout the plant. Technical issues, in general, have been satisfactorily addressed by the licensee.

B. Facility Performance Summary

The performance categories for the current and previous SALP period in each functional area are as follows:

Functional Area	November 1, 1985- July 31, 1986	August 1, 1986- June 30, 1987	Salp Period Ending Trend
Current Activities			
A. Plant Operations	NR	2	
B. Radiological Controls	2	2	
C. Maintenance	NR	1	
D. Surveillance	NR	1	
E. Fire Protection	2	1	
F. Emergency Preparedness	1	2	
G. Security	1	2	
H. Quality Programs and Administrative Controls Affecting Quality (Operations)	2	2	
I. Licensing Activities	1	1	
J. Training	2	2	
K. Preoperational And Startup Testing	2	2	
L. Engineering Support	NR	2	
M. Construction Activities	(see below)	2	
Previous Activities			
Piping Systems and Supports	1	NR	
Auxiliary Systems	1	NR	
Electrical Equipment and Cables	2	NR	
Instrumentation	2	NR	
Quality Programs and Administrative Controls Affecting Quality (Construction)	2	NR	
Licensing (Construction)	1	NR	

Note: NR- Not Rated

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

During this assessment period routine and special inspections were performed in the area of plant operations. The routine inspections included observations of plant start-ups, plant shutdowns, operating at power, control room activities and operator demeanor, plant transients, performance of valve line-ups and the routine recording of plant parameters. Special inspections were conducted to ensure that the licensee was adequately prepared in this area prior to full power operations. The special inspections evaluated the licensee's Technical Specifications, plant operations, emergency procedures and other plant procedures which support operation of the plant.

The plants' operational history during this assessment period was relatively short. The plant received its full power license on January 12, 1987, and became commercial on May 2, 1987.

During the witnessing of selected plant start-ups and shutdowns the inspectors noted that the operations personnel performed their duties in accordance with available procedures while maintaining a professional attitude throughout the evolution. Operations personnel controlling reactivity and power changes were alert and aware of the plant parameters for which they were responsible. During abnormal conditions the inspectors noted that the operations personnel were quick to use all available information, indications and procedures to determine the correct actions to place the plant in a stable condition. Routine plant evolutions, such as obtaining plant readings, were conducted in a professional and efficient manner. The control room operators were always dressed in the distinguishing clothing required by the plant administrative policy. The policy requires all on duty control room operators to wear light blue shirts with dark blue trousers and the shift foreman is required to wear a white shirt with dark blue trousers. The shift rotation schedules were frequently reviewed; all on duty control room operators were as shown on the schedule. The shift foreman's logs were reviewed on a daily basis and were found to be legible, and they clearly reflected the plant status. Monthly engineered safety features systems walkdowns were performed; the inspectors always found that the system valves were properly aligned. Having the valves properly positioned was an indication that the operations personnel were properly controlling the status of plant systems. The plant was routinely inspected for the condition of housekeeping and was always found to be exceptionally clean. As a result of the previously noted special inspections, some weaknesses were identified with the licensee's procedures for operations. In each instance the licensee upgraded the procedures to eliminate the weaknesses which they may have

contained. The improved procedures were then reviewed again during follow-up inspections and were found to be acceptable.

The licensee's Emergency Operating Procedures (EOP's) were evaluated in addition to reviewing the licensees Procedures Generation Package, Plant-Specific Technical Guidelines, and the Validation and Verification (V&V) Program. The following noteworthy concerns were identified with respect to Operations:

The EOP's lacked procedural detail and relied heavily on operator knowledge;

There were apparent inconsistencies between the EOP's and the Writer's Guide;

As part of the V&V program, the EOP's were not verified to be in compliance with the Writer's Guide;

Certain plant-specific information which was called for in the Westinghouse Emergency Response Guidelines had not been provided for in the Harris EOP's.

The licensees satisfactorily addressed identified deficiencies and these actions were reviewed in subsequent inspections.

A description of the plant trips which occurred during this evaluation period is provided in section V.I. Of the seventeen listed reactor trips four were due to equipment failure, six due to design error, one due to fabrication error, three due to inadequate procedure controls, one due to non-licensed personnel error, and two due to licensed personnel errors. In each instance the licensee management has provided corrective measures which should reduce the plant trips caused by personnel error. Equipment failures have been addressed by the licensee's predictive and preventative maintenance programs. Design and fabrication problems were corrected by rework or modifications and have been reviewed by the design engineering group. The number of trips initiated by the secondary system main feedwater transients was larger than those experienced at other Westinghouse near term operating license (NTOL) plants.

Prior to reaching full power operations, the plant experienced nine reactor trips which were attributed to the condensate and feedwater systems; one additional trip occurred in May 1987 shortly after the plant was declared ready for commercial operation. Due to the integrated operating nature of the secondary plant systems, the licensee recognized a need to continue operating the plant and collect the detailed data for analysis. Aggressive action was needed to identify the root causes and initiate corrective action. On March 20, 1987 a multi-disciplined task force was formally chartered to review and recommend reliable improvements for the secondary plant.

The task force evaluated the accumulated plant response and trip data and determined that the problems with the secondary systems were

associated with system instability caused by a high differential pressure across the main feedwater regulating valves and a need to optimize individual pump trip protections in order to stabilize secondary plant transients. As a result of the evaluation, the licensee changed time delay setpoints on the main feedwater and condensate booster pumps and began throttling the main feedwater flow to reduce oscillations across the feedwater regulating valve. These changes have provided a temporary fix for the secondary system transients. The task force has taken long range action to require permanent changes to the secondary system design. Before the design changes were recommended, a hydraulic study was conducted of the secondary systems, optimizing pressures and flows. Licensee management currently plans to implement some of the recommended changes during the October 1987 plant outage. Following the initiation of the temporary fixes for the secondary systems, the number of reactor trips caused by secondary plant transients decreased significantly.

Plant management involvement in the routine and non-routine activities continued to become more effective with continued operating experience. Site management was frequently observed in the field for the purpose of obtaining firsthand knowledge of the plant status and ongoing work activities. Work and maintenance activities were continuously monitored by management through the daily Plan of the Day Meeting. Management's attention to items of concern expressed by NRC personnel was apparent by their responsive attitude, as evidenced in their frequent, open communications with both the public and regulatory authorities. Some of the programs advocated by site management which demonstrated their commitment to excellence included the following: active involvement with the site ALARA program, commitment to the operator's "Code of Ethics", strong support of a thorough pre-shift briefing held by all personnel on shift, dedication of a space outside the control room for use as a clearance center office to reduce the potential for interfering with activities in the control room, and promotion of the computer-generated Work Request and Authorization reporting program to keep abreast of minor problems which could be indicative of larger underlying problems. The operator's "Code of Ethics" was recently developed and established by the licensee's plant operators.

Four violations were identified in the operations area. Two of them were identified during special inspections and the remaining two resulted from routine inspections. Those identified during special inspections are listed as a. and b. below. The first violation identified an instance where operators failed to comply with procedural requirements when securing an emergency diesel generator. The second resulted when operations personnel did not conduct a thorough review of a surveillance test procedure prior to allowing it to be implemented. The remaining two violations were both identified during routine inspections and both were the result of operations personnel not following procedural or Technical Specification requirements.

Four violations were identified:

a. Severity Level IV violation for failure of operators to monitor exhaust gas temperatures prior to securing diesel generator 1A-SA. (400/86-76-17)

b. Severity Level IV violation for failure of operations personnel to review a maintenance surveillance test properly prior to implementing the test, which resulted in an isolation and depressurization of a reactor coolant system pressure transmitter. (400/86-93-01)

c. Severity Level IV violation for failure of operations personnel to properly remove a clearance tag and restore equipment to its proper configuration, resulting in a steam dump valve remaining inoperable for two months. (400/87-04-09)

d. Severity Level IV violation for failure to maintain access control resulting in personnel entering into the containment building through an access door which should not have been open, violating operational Technical Specification requirements. (400/87-21-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

B. Radiological Controls

1. Analysis

During the evaluation period, startup and operational inspections were performed by the resident and regional staffs in the areas of worker dose control, gaseous and liquid effluent treatment and monitoring, post accident sampling and water chemistry.

The licensee's health physics, chemistry and radwaste staffing level was adequate in that a sufficient number of ANSI qualified licensee and contract staff were available to support startup and outage operations. The quality and experience level of the health physics operations, radwaste and radioactive material transportation personnel was a program strength.

One violation (a. below) involved the licensee's failure to perform an adequate shield verification radiation survey during startup testing. The survey was oriented toward exposure control only and not toward verification of the integrity of the shield. Personnel performing the survey deviated from the specifications of the procedure as to locations and methods for obtaining measurements. These deviations were not documented on the survey data sheets, and the results could not be accurately reviewed or reproduced.

Startup testing of gaseous effluent treatment systems was adequate. Startup testing of several components or subsystems of the liquid radwaste system was delayed until an unspecified later date pending results of operational feasibility. The licensee's decision on feasibility is awaiting results from tests on similar systems at other facilities. The liquid radwaste system currently in use consists of mixed bed nonregenerable demineralizers with the spent resins to be dewatered and shipped to a disposition site. Self-identified problems and NRC-identified items in liquid and gaseous effluent monitoring were addressed promptly with an adequate level of technical effort.

The need for improvements in the licensee's program for assessing worker exposures was identified during the assessment period. The licensee failed to perform adequate evaluations of exposures to noble gas during containment entries. Health Physics personnel at the plant and the Harris Energy Center (corporate HP group) thought the thermoluminescent dosimeter (TLD) measured exposures from noble gas, but the TLD algorithms had been established such that exposures to the lens of the eyes and skin of the whole body were not being accurately assessed. The error in the algorithms was found to be applicable to all the utility's nuclear plants.

Because of design and operational deficiencies on such major components as the main condenser, water treatment plant, and condensate polishers, effective chemistry control was being

maintained only with considerable difficulty. Licensee management has decided to replace the existing main condenser tubes with titanium tubes. The existing tubes are made of copper-nickel and are causing problems with secondary chemistry. Likewise, the licensee had not overcome the design deficiencies of the primary and secondary chemistry sampling facilities. In all other aspects of the chemistry program; e.g., staffing, training, construction and equipping of laboratories, developing procedures for analyses, quality control, and data management, the licensee had developed appropriate programs.

As of April 1987, the licensee had expended 11 man-rem during startup. The collective dose goal for the year was 100 man-rem. This goal is reasonable considering the fact that the facility is beginning operation. The actual exposure was consistent with that of other facilities with similar operating history.

The licensee's annual goal for solid radioactive waste disposal was 6,500 cubic feet. The licensee was making preparations for their first radioactive waste shipment at the end of the assessment period. The licensee has an aggressive program to minimize contaminated areas. The licensee's goal is to keep the total area controlled as contaminated less than 25,000 square feet (5.4%), The actual area being controlled at the end of the assessment period was approximately 1500 square feet.

Two violations were identified.

a. Severity Level IV violation for failure to perform adequate shield verification startup survey. (400/87-14-02)

b. Severity Level IV violation for failure to perform adequate evaluations of exposures to noble gas. (400/87-22-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

C. Maintenance

1. Analysis

During this evaluation period routine inspections were performed by both the resident and regional inspection staffs. The scope of these routine inspections included: review of the procedural controls for generation, implementation and closure of work requests; review of both preventive maintenance and surveillance testing; review and witnessing of repair, modification and troubleshooting techniques for plant equipment.

Licensee site management has implemented an automated maintenance management system which allowed the site to plan new work, initiate work orders and track these work orders to completion. Additionally, the program has also proven invaluable when planning preventive maintenance. Maintenance procedures reviewed were adequate.

The licensee has provided a maintenance feedback program which allows maintenance personnel a method of documenting items of concern which require resolution. This system ensured that maintenance personnel can provide an input if a need is found which required plant modifications or maintenance. Maintenance related decisions which were made by management have generally been thorough and shown clear understanding of technical issues. Maintenance activities have been well planned and those activities evaluated were completed in accordance with the appropriate procedures and skills. Maintenance records received a very thorough review after completion of the task. The licensee's program for removal and restoration of equipment from service appeared to be satisfactory. Maintenance management and technicians have demonstrated an understanding of the program and its requirements.

The plant experienced some steam generator feedwater back leakage through the initially installed auxiliary feedwater system check valves. The leaking valves were removed and attempts were made to repair the valves. The valves were relapped by licensee employees, and finally the supplier attempted to repair the valves, but both were unsuccessful. Subsequently a plant modification was made to the auxiliary feedwater system during April and May 1987 to reduce the back leakage. The modification required the addition of another check valve for each of the auxiliary feedwater lines between the pump discharge and the associated steam generators. The modification has reduced the potential for back leakage through the originally installed valves. The repairs and the addition of the new valves were evaluated during routine inspections in the maintenance area. The maintenance technicians demonstrated a thorough understanding of the drawings, specifications and procedures associated with the work which was performed during the repairs and modification. Management involvement during the modification was evident by the frequent interaction between supervision and maintenance technicians.

One violation was identified:

> Severity Level V violation for failure of a maintenance technician to verify that the "B" train safety injection signals were blocked prior to returning the system to normal, resulting in an inadvertent initiation of safety injection. (400/86-87-01)

2. Conclusion

Category: 1

3. Board Recommendations

NONE

D. Surveillance

1. Analysis

During the assessment period routine inspections were conducted in the surveillance area. The inspections included a review of surveillance procedures for technical adequacy and cross reference to the Technical Specifications. The licensee's scheduled surveillance program was routinely evaluated to verify the following: surveillance testing was performed as scheduled; tests were conducted in accordance with approved administrative controls, and test results were reviewed in a timely manner by the appropriate personnel. The routine evaluations included witnessing surveillance test activities associated with electrical systems, pump and valve in-service testing, mechanical systems, core physics and instrumentation.

The licensee was in the process of developing a computerized system for scheduled surveillance tests. This system will use a cross-reference to the Technical Specifications and appropriate test procedures which will be used to satisfy all requirements. The licensee established program appeared to be an acceptable method of scheduling surveillance requirements. The tests were completed on the dates for which they were scheduled, with a few exceptions. Records indicate that the licensee has missed less than 20 of the approximately 13,000 routinely scheduled surveillance tasks.

The licensee assigned an Instrumentation and Control crew for each shift which works to complete all scheduled surveillances. These personnel are provided with documents which will alert them to expected test indications and prevent the simultaneous performance of tests which should not be run at the same time.

Management involvement in this area was evidenced by implementation of the computerized surveillance system, assignment of the special surveillance crews, and the licensee's prompt responses to NRC inquiries and concerns. The concerns were identified and resolved earlier in the evaluation period and dealt with surveillance procedural inadequacies and lack of acceptance criteria.

One violation was identified:

> Severity Level IV violation for failure of personnel to evaluate auxiliary feedwater pump surveillance test data within the time required by ASME Section XI. (400/87-06-01)

2. Conclusion

Category: 1

3. Board Recommendations

NONE

E. Fire Protection

1. Analysis

During this assessment period inspections were conducted by the regional and resident inspection staffs in the area of the licensee's completion of fire protection features and implementation of the fire protection program. Routine plant tours included the following fire protection activities: observation for the presence of fire watches as required; proper storage of combustible materials; and the presence of fire protection personnel at shift briefings. In general, plant fire protection equipment was found to be in proper working order. During the previous assessment period, the NRC inspectors and the licensee's operations group identified a number of design and installation discrepancies involving fire protection features. These items were corrected during this assessment period.

These actions indicate an adequate licensee program toward achieving completion of work required to close out open fire protection issues. Based on the results of the followup inspection, the licensee's present fire protection program has adequately addressed those concerns identified during the previous period.

Considering the implementation of the licensee's fire protection program and the prompt initiation of the corrective actions, it was evident that the licensee assigned the appropriate level of resources at the site to assure the fire protection features met design requirements and commitments made to the NRC. The administrative procedures for control of the fire protection program was adequate and met NRC requirements. Adherence to these procedures was satisfactory considering that the plant was in a transition during this period from preoperational testing to operations.

In general, the licensee's performance in the area of fire protection has improved over the previous assessment period. Upper management has provided the necessary support for implementation of the plant fire protection program and was aware of the importance of fire protection. The licensee's response to NRC initiatives has generally been timely. Additionally, the licensee has continued to provide a training area for use by the local community fire departments, for integrated training and exercises.

No violations or deviations were identified.

2. Conclusion

Category: 1

3. Board Recommendations

NONE

F. Emergency Preparedness

1. Analysis

During the assessment period inspections were performed by regional and resident inspection staffs. The inspections included the observation of both a partial participation and a full participation emergency exercise, and monthly tours of the Technical Support Center and other emergency facilities.

The partial participation emergency exercise conducted October 28, 1986, identified four exercise weaknesses. The first weakness addressed poor procedural adherence and Technical Specification compliance during the simulated cooldown which resulted in the operators attempting to cooldown and depressurize with no source range nuclear instrumentation available. Another weakness involved differing interpretations of the emergency action level (EAL) scheme among participants, which resulted in a delay in classifying the emergency and a resulting delay in subsequent emergency actions. The licensee provided different times and different initiating events for the Alert classification in reports to the NRC, the State and counties. There was also incomplete accountability of selected on-site personnel. Other observations during the exercise included a delay in activation of the Emergency Operations Facility and significant differences between the dose projection and field monitoring team data during the exercise.
During the partial participation exercise the licensee demonstrated the ability to promptly staff the on-site Technical Support Center and Operations Support Center, the ability to identify and classify events with the one exception previously noted, the ability to handle the plant casualty, the ability to communicate with offsite agencies, and the ability to make protective action recommendations. The licensee conducted an adequate exercise critique and committed to correct the confusing EAL scheme by December 15, 1986, and to demonstrate an accountability of selected personnel during the full participation exercise scheduled for February 1987.

The identified exercise weaknesses were reviewed during the February 28, 1987 exercise. The licensee had taken actions to correct the weaknesses. The EAL scheme had been revised, notification and followup messages were accurate and consistent and the accountability procedure had been revised. No problems were observed in the area of Emergency Operations Facility Activation or deficiencies between dose projection and field team data. The licensee's performance during the full participation exercise was significantly improved and no exercise weaknesses were identified.

The original scenario package developed for the partial participation exercise of October 28, 1986 was inadequate and failed to assure that all exercise objectives would be met or that critical Emergency Plan elements would be tested. The licensee submitted a revised exercise

scenario package to replace the package initially submitted. The scenario developed for the full participation exercise of February 28, 1987 was not sufficiently challenging to all elements of the Emergency Preparedness organization as indicated by the fact that no entries into a radiological controlled area were required during the exercise. Nevertheless, it was apparent that the improved performance was indicative of increased management attention and support to the emergency preparedness program.

No violations or deviations were identified.

2. Conclusion

Category: 2

3. Board Recommendations

NONE

G. Security

1. Analysis

During this assessment period, inspections were performed by the resident and regional inspection staffs. Several special inspections were also performed. Security personnel were observed on a daily basis carrying out their assigned duties. These observations included evaluating routine security force tasks, compensatory measures being established when required, and management's sensitivity and promptness in reporting security events.

The licensee received seven violations during this rating period. These violations can be attributed to a lack of centralized security management oversight of the details of the security system hardware and barriers. Security management was depending on different plant disciplines to perform barrier and barrier penetration walkdowns. Half of the violations identified related to barrier breaches and associated lack of compensatory measures. The other violations for the most part were due to a lack of understanding of the need for compensatory measures. This can be attributed to the inexperience of the security force and the need for a longer period of time for the security force to operate security equipment and implement the security program prior to licensing and fuel loading. The time span between final implementation of security requirements and licensing was brief, which resulted in the current poor enforcement history.

During an enforcement conference the licensee assured the Region of a strong management and personnel commitment to security and regulatory compliance. This commitment has been demonstrated by the licensee's responsiveness to NRC findings, implementing prompt and comprehensive corrective measures. A particularly noteworthy action on the licensee's part was the formation of a task force including management, security, engineering, and construction to ensure vital area barrier integrity. The scope of this task force was expanded to assure compliance with security commitments. This task force identified numerous areas that required improvement or that could be enhanced; for example, barrier penetrations were identified and implementing procedures were improved. These areas were brought into compliance rapidly and completely. However, many of these areas should have been addressed prior to licensing.

The operational capability of the contract security force was enhanced by an effective training program, quality assurance efforts, and managerial support at both plant and corporate level. As violations were identified, the security force was trained on preventative measures and briefed on the lessons learned.

Seven violations were identified:

a. Severity Level III violation for failure to control a pathway into a vital area. (400/87-07-01)

b. Severity Level IV violation for failure to control a pathway into a vital area. (400/86-95-01)

c. Severity Level IV violation for failure to implement compensatory measures. (400/86-90-01)

d. Severity Level IV violation for failure to implement compensatory measures. (400/87-08-05)

e. Severity Level IV violation for failure to implement compensatory measures. (400/86-92-01)

f. Severity Level IV violation for failure to follow alarm response procedures. (400/86-92-02)

g. Severity Level V violation for failure to provide adequate documentation of compensatory measures. (400/86-90-02)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

H. Quality Programs and Administrative Controls Affecting Quality

1. Analysis

During the assessment period inspections were performed by the resident and regional inspection staff. The daily activities of the QA/QC organization were routinely evaluated. The evaluation included observation of the presence of QA personnel during major start-up activities and inspections by QC personnel at the designated hold points during maintenance activities.

QA management has made organizational changes; more experienced personnel have been assigned to conduct QA surveillance activities and supervise QC inspectors. The new assignments have resulted in more meaningful QA surveillance evaluations and better utilization of site QA personnel. As an aid for scheduling QA surveillances, the licensee has developed a computer system which monitors the surveillance tests required by Technical Specifications. This new system has made the QA/QC transition from construction to operations easier.

The Quality Check program continued to exist as a proven aid for licensee personnel to identify unsafe conditions which require resolution. A significant reduction in the number of items being identified through the Quality Check program was noted. The reduction was attributed to increased management involvement resulting in more prompt identification and resolution of nonconforming conditions utilizing the site procedures for documenting and controlling nonconforming conditions. QA surveillance personnel conducted evaluations on all site activities which may impact nuclear safety. The evaluations have been extended to many secondary nonsafety-related systems which, if impaired, may impact the reliability of the engineered safety systems.

Various functional areas such as audits, procurement, and design control were programmatically reviewed prior to issuing the operating license. Those programmatic deficiencies that were identified were reinspected and corrective actions appeared to be satisfactory.

Management involvement was evident by the issues which have been identified for resolution by both the onsite nuclear safety group and the onsite QA surveillance personnel. Management reorganized the QA/QC group to improve the site QA group, strengthen the QC group and to place more experienced personnel in the offsite QA audit group.

A review was performed on all sections of the SALP report in an attempt to capture apparent strengths and weaknesses related to management controls affecting quality.

The following are some perceived strengths in management controls affecting quality:

Management was active and supportive of the fire protection program which improved significantly as the plant went from construction to operation.

Task force established to evaluate cause of secondary system trips resulted in modifications and adjustments to reduce this trip source potential.

Strong emphasis on thorough pre-shift briefings and measures taken to reduce interfering activities in the control room.

A maintenance feedback program was established to permit maintenance input on plant modifications.

Formation of a task force which included management, security, engineering and construction to ensure vital barrier integrity.

Management reorganized QA/QC to strengthen both groups and utilize more experienced personnel.

Management demonstrated a strong and aggressive approach in resolving various technical issues in support of issuance of the low power and full power licenses.

On-site engineering groups provided thorough technical information to those organizations requesting assistance.

The licensee provided extensive support to the resolution of employees' allegations.

The following are some perceived weaknesses in management controls affecting quality:

Lack of centralized security management oversite of the details of security system hardware and barriers.

Licensee's program for assessing worker exposures requires improvement.

Group 1 operators which did not receive simulator training did not display the expected degree of performance considered necessary for licensed operators.

In the area of emergency operating procedures (EOPS) weaknesses were identified in implementation of vendor recommended guidelines, programmatic feedback of information gaps in flow charts and procedures to training, assurance that training provided adequate background knowledge for use of EOPS, and providing an adequate variety of scenarios for simulator exercises on EOPS.

A trend of craft personnel performing work without appropriate procedures was not effectively corrected by management.

One violation was identified:

Severity Level IV violation for failure to control and require compliance with procedures during the conduct of work in accordance with the Work Request and Authorization Program. (400/86-68-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

I. Licensing Activities

1. Analysis

The basis for the appraisal in this area was the licensee's performance in support of licensing actions (low power license, full power license, amendment requests and other actions) which have been reviewed and evaluated by the staff during the rating period. The activities associated with this rating period included those in the prelicensing period (August-October, 1986) which culminated in the issuance of a low power license, and those associated with the issuance of a full power license. These issues are identified below to reflect the transitional aspects of this licensing application. The low power and full power licenses were issued in October 1986, and January 1987, respectively. Twenty eight technical issues were resolved in Supplement No. 4 to the Safety Evaluation Report in support of the issuance of the low power licensee. Seven issues were unresolved in the Safety Evaluation issued with the full power license.

Management continued to exercise control and overview in the licensing activity area as evidenced by the very successful manner in which the various issues associated with the preparation of both the low power license and full power license Technical Specifications were resolved. Throughout the period of Technical Specifications development the licensee had exhibited a very straightforward attitude and provided rapid responses to questions raised by the staff. The licensee's management continued to take a strong and aggressive approach in resolving various technical issues which resulted in the very timely resolution of all issues necessary to support the issuance of a low power license in October 1986, and a full power license in January 1987. The licensee's computer system, which keeps abreast of all issues requiring resolution, contributed significantly to the effective management of licensing activities. The licensee's management demonstrated a good understanding of the various technical and licensing issues. Licensing personnel who are generally in daily contact with the NRC licensing project manager had an excellent understanding of the technical and licensing issues. Monthly meetings were generally held with the NRC staff to discuss scheduling and prioritization of licensing activities. Since the full power licensing, the licensee's amendment requests were submitted in a very timely manner indicating the licensee's sensitivity to allow appropriate lead time for NRC staff review. Moreover, while there were only a limited number of amendment requests, the NRC licensing project manager was always informed by the licensing personnel of the pending amendment request several weeks in advance of its submittal. This enhanced the overall management and the scheduling of licensing activities.

The licensee's response to NRC initiatives was prompt and generally complete. The licensee's continued involvement in a significant

number of utility advisory and owners groups was indicative of their commitment to be aware of the methods of timely resolution of issues of a generic nature such as the issue on Transamerica Delaval diesel generators.

Daily communication between the licensee staff and the NRC Licensing Project Manager continued to yield timely and sound technical responses to NRC initiatives. An example of this initiative was the detailed presentation by the licensee, as requested by the NRC staff, on the root causes of balance-of-plant initiated trips and the planned corrective actions to minimize plant trips. It should also be noted that the licensee voluntarily made available to the NRC staff its evaluation of the performance indicators for the Shearon Harris plant and its comparison with other Westinghouse near-term operating license plants (NTOLs).

The licensee's, licensing staff have a solid working knowledge of the regulations, guides, standards and generic issues as they apply to the Shearon Harris facility. One member of the licensing staff was Chairman of the Westinghouse Owners Group Technical Specification Subcommittee coordinating the Technical Specification Improvement Program. The assignment of certain licensing personnel at the site, in conjunction with the coordination with the off-site licensing staff, continued to result in prompt and timely responses to the NRC staff needs in the area of licensing. In addition, the licensee has had both the Senior Vice President, Operations Support Group, and the Manager of Licensing and Nuclear Fuels received training using the plant specific simulator, indicating an effort to expand the knowledge of its licensing staff at all levels.

The licensee promptly notified the NRC Licensing Project Manager of operational events generally after they evaluated the cause of the event. License Event Reports (LERs) were submitted on a timely basis. However, a recent AEOD report dated July 22, 1987 compared LER's from August 1986 through June 1987 with the reporting requirements of 10 CFR 50.73(b) and the guideline contained in NUREG-1022, and concluded that both the texts and abstracts contained significant deficiencies and the overall documentation quality was well below the industry average.

No violations or deviations were identified.

2. Conclusion

Category: 1

3. Board Recommendations

NONE

J. Training

1. Analysis

During this assessment period, there were three routine inspections conducted in the area of training at the Shearon Harris facility, as well as several examinations of licensed operators and licensed operator candidates. Two of the inspections were conducted to ascertain the licensee's degree of operational readiness, and the third was as a result of a plant overpressurization event that occurred on December 3, 1986.

During this assessment period several simulator examinations of both licensed operators (Group 1) and licensed operator candidates (Group 2) were administered. Group 1 operators (examined in November 1985) originally did not receive simulator examinations; however, these operators were subsequently observed by the NRC performing simulator evolutions and did not display the expected degree of proficiency considered necessary for licensed operators. As a result of the Group 2 (May 1986) low simulator examination pass rate, The NRC administered simulator examinations to all Group 1 licensed operators as well as Group 2 reexaminations. These examinations were conducted the weeks of September 22 and November 3, 1986, and February 23, 1987.

Six individuals from Group 1 failed, one of them twice. Of these, four successfully passed their initial retake (2nd) examination, one passed his subsequent retake (3rd) examination, and one is in appeal. Four Group 2 individuals failed their reexaminations in the assessment period. Of the four Group 2 failures, one has left the facility and one has successfully appealed his initial failure recommendation, one has passed his initial retake (2nd) examination and one has never reapplied.

Emergency Operating Procedure (EOP) training was evaluated during the assessment period. The inspection noted that although the operators appeared to be comfortable with the use of the flow path network and familiar with the intent of the procedures, the inspectors identified three concerns with respect to procedural knowledge. These concerns were primarily based on the level of detail required to be memorized by the operators in the verifications of automatic actions and the omissions of "Response Not Obtained" in both the flow paths and the narrative procedures. These concerns were also previously identified by an NRR audit team.

There was no program to assure that information gaps in flow charts and textual procedures would be addressed specifically during future training;

The extensive use of flow charts in the EOP's as described in the writers guide, reduce the amount of information

that procedures can provide to operators. The training program must compensate for this lack of information;

Training should initiate the use of a wide variety of scenarios, including multiple failures, to fully exercise the EOP's on the simulator and thus expose the operators to a wide variety of EOP uses.

The licensee made commitments to address the NRR audit team findings as well as the inspection team findings. The licensee subsequently satisfactorily addressed all of the concerns. An additional concern was identified regarding the licensee's implementation of a comprehensive EOP training program consistent with the completion of simulator modifications which were in progress and the restoration of a five-shift rotation operation program. The corrective actions for this concern were implemented prior to the conclusion of the assessment period.

The following deficiencies relating to training effectiveness were identified and resolved. Regarding the ability of licensed or non-licensed operators to reset a tripped emergency diesel generator, the licensee has provided adequate training to ensure non-licensed operators are proficient in the resetting of the manual overspeed trip. In addition, the licensee implemented a program to transmit EOP related deficiencies identified during training to the technical support section. Finally, the inspector concern with the operators' required reading program was closed out upon the review of new administrative controls as well as a review of required reading records. Overall, the licensee was prompt in both their responses and subsequent corrective actions.

The licensee established a method of qualifying janitorial personnel to perform pre-release radiological surveys of material and equipment from the plant's controlled area. This task is normally performed by a qualified health physics technician, since doing such a survey improperly could lead to radioactive material being released to the public. The licensee had no procedures, lesson plans, qualification cards or any other documentation or specification for the training. Although training of staff personnel, including contractors filling responsible positions, is required by Technical Specifications, the licensee took the position that training in these tasks and documentation of training in these tasks was not required. Normally, a Notice of Violation would have been issued on this finding; however, pursuant to the Commission Policy Statement on Training and Qualification of Nuclear Power Plant Personnel (50FR1147, March 30, 1985) and the memorandum of understanding with INPO, the finding was characterized as an unresolved item pending NRC review of the acceptability of the licensee's corrective action. The licensee had not completed the implementation of their corrective action by the end of the assessment period.

From January 1987 through July 1987 approximately 500 students were trained in the maintenance area and other technical areas totaling

about 5800 student hours. The total site training for 1987 consists of approximately 42,500 hours and the cumulative training for the Harris Plant exceeds 530,000 hours.

The overall training of site personnel was observed during routine inspections in several of the areas which were evaluated during this SALP period. Those which were observed included: maintenance personnel, security personnel, plant operators, fire protection personnel, site inspection personnel, radiation/health physics personnel, and the members who participated in the site emergency preparedness exercises. In general, observations indicate that personnel were aware of procedural requirements and have demonstrated proficiency in the various areas.

All ten of the Harris Plant training areas have been accredited by the Institute of Nuclear Power Operations (INPO). The Reactor Operator, Senior Reactor Operator, Shift Technical Advisor and nonlicensed operator training programs were accredited during June and July 1987. Chemistry technician, radiological protection technician, and technical staff and management training programs were accredited in September, 1986. The remaining areas were accredited during a previous SALP period, i.e., instrumentation and control technician and electrical and mechanical technician training programs were accredited in December 1985.

No violations or deviations were identified.

2. Conclusion

Category: 2

3. Board Recommendations

NONE

K. Preoperational and Startup Testing

1. Analysis

During the assessment period, routine inspections were conducted by regional and resident inspection staffs in the areas of: test procedure review, witnessing of tests in progress and the evaluation of completed test results. The inspections included: review of the as-built plant conditions; evaluation of the initial operational surveillance tests, modification controls; and evaluation and adequacy of operations staff manning requirements, training requirements, and initial fuel loading operations completed on November 21, 1986.

Licensee activities during the assessment period were concentrated on preparation for fuel loading and startup. Management and plant staff involvement, to assure that the preoperational test program was essentially completed, was thorough and well documented. Major preoperational test milestones completed during the assessment period included the engineered safety features integrated test, in conjunction with the loss of offsite power test. Following these tests, several Technical Specifications related surveillance tests were performed on ESF equipment and components. As a result of these tests it was determined that certain ESF components had either not been preoperationally tested or inadequately tested in the test mode. The affected features were the emergency diesel generator output breakers trip feature when in the test mode, sequencer test panel blocking relays which permitted starting of ESF equipment, and the blocking relay for the 6.9kv and 480v emergency buses. These concerns were identified in a violation. The licensee was responsive to the NRC in these matters and took effective corrective action. All of these issues were resolved prior to the end of the assessment period.

Prior to the beginning of actual startup testing, region-based inspectors conducted three inspections to review proposed test procedures. Licensee personnel were responsive to comments on improvements in test methodology, data collection, and analysis. The as-found procedures showed the positive effects of lessons learned in writing and performing the procedures for the preoperational test program.

Region-based inspectors witnessed all or portions of many of the major test activities including: initial fuel load, initial criticality, zero power physics tests, shutdown from outside the control room, and loss of offsite power. Test personnel consistently demonstrated familiarity with the tests they were to perform, and their observed briefings to on-shift personnel were detailed and adequate.

Review of the completed startup tests was completed through the fifty percent power level during this assessment period. With the exception of one precritical test, reactor coolant system leakage, all completed tests reviewed were acceptable. Management and test personnel showed a commendable interest and dedication toward obtaining quality test results as well as meeting the test schedule. Subsequent to the end of the assessment period, the remaining startup tests were reviewed by regional inspectors with no adverse findings.

Three violations were identified.

a. Severity Level IV violation for failure to conduct preoperational tests on ESF components to demonstrate that their design features will perform in service. (400/86-88-01)

b. Severity Level IV violation for failure to adequately account for changes in the measured parameters leading to errors in the design and magnitude of leakage from the reactor coolant system. (400/86-96-01)

c. Severity Level IV violation for failure to provide adequate housekeeping controls around the reactor vessel during initial fuel loading. (400/86-89-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

L. Engineering Support

1. Analysis

Evaluations were performed by resident and regional inspection staffs which included both routine and special inspections.

The licensee operated two separate engineering organizations located at the Harris facility. One group, Harris Plant Engineering Section, provided design support for the project during the start-up and operation phase and reported directly to the site Milestone Completion Manager. Design support included review and approval of plant design changes and modifications, engineering support of equipment problems and engineering design limits for systems being tested. The other group, Operations Technical Support, reporting to the Plant General Manager, provided aid to the operations group during the development of procedures for maintenance, equipment operation, and equipment surveillance. Additionally, Operations Technical Support reviewed surveillance test results to determine the acceptability of data. One of the prime objectives of these engineering support groups was the evaluation of plant modifications to determine if the changes created an unreviewed safety question as outlined per 10 CFR 50.59.

Both of the engineering groups provided thorough technical information to those organizations requesting or needing their assistance. The individual responsible for Operations Technical Support was also placed in charge of the start-up and power ascension phase. His assignment prior to being Manager of Operations Technical Support at the Harris Plant included being Manager of Maintenance. His experience with the plant systems and components as Manager of Maintenance proved to be a positive asset to the start-up program.

During this evaluation period the site implemented two significant changes within the Harris Plant Engineering Section. One change resulted from the misuse of Field Change Requests (FCRs) (controlled by the Construction Design Engineering program). FCR's were being used by design to authorize changes to systems which had been previously declared operational. Design should have been using the operations Plant Change Request (PCR's) procedures for design changes on systems which had been declared operable. The licensee conducted an evaluation of all FCRs which were drafted on systems which previously had been declared operable. No additional concerns resulted from the evaluation. To prevent FCR's from being misused again, the licensee discontinued the use of the FCR system and required that all future plant design changes be the controlled in accordance with the Operations Design Engineering program using the Plant Change Request procedures. The Operations Plant Change Request procedures are more comprehensive concerning the effects which design changes may have on system operability. The licensee also reorganized the Harris Plant Engineering section requiring them to report to the site Milestone Completion Manager rather than to the site Vice-President.

Four violations were identified. One dealt with design process not providing an adequate review to assure that calculation methods were correct. The calculations involved design documents affecting structural steel. Two violations were associated with engineering's failure to update plant drawings promptly to show the as-built condition of the plant. One of the design drawings affected was a simplified flow diagram for the emergency service water system; the other drawings were associated with the main control board. The fourth violation identified instances where the design group failed to perform an adequate review of two plant change requests which affected safety-related systems.

The licensee's corrective action to the violation concerning inadequate design review for structural supports did not identify any major rework items. The two violations dealing with drawings not reflecting the as-built condition of the main control board and the emergency service water system, were caused by inattention to procedural details by engineering personnel. The licensee evaluated the cause of these two violations and found that it was limited to a few drawings. The drawings which required updating were changed to reflect the as-built condition of the plant and personnel were reminded about the importance of detail compliance with procedural requirements. The last violation was identified near the end of the SALP period.

Four violations were identified:

a. Severity Level IV violation for failure of design engineering to provide an adequate design review on design changes which affected the installation of structural supports. (400/86-77-01)

b. Severity Level IV violation for failure of engineering to control update of drawings for the as-built condition of the main control board. (400/86-80-01)

c. Severity Level V violation for failure of engineering to update a Simplified Flow Diagram for the emergency service water system to reflect as built condition. (400/86-60-01)

d. Severity Level V violation for failure of engineering not to provide an adequate evaluation of plant modifications as required by 10 CFR 50.59. (400/87-20-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

M. Construction Activities

1. Analysis

During the evaluation period, inspections were conducted by regional based inspectors and IE contract inspectors to follow up on allegations pertaining to alleged improper design and construction practices in this functional area. This inspection involved extensive effort to followup on more than 50 different concerns (allegations). Two of the allegations which were substantiated had safety significance. These allegations concerned improper design verification practices in design of cable tray supports and the new fuel pool support racks. As a result, one violation with two examples of failure to implement adequate design control measures was identified. Eight other allegations were also substantiated, but these had no safety significance. The remaining allegations were not substantiated. During this inspection effort, one additional violation was identified concerning failure to follow procedures in structural steel welding and welding inspections. This violation was not directly related to the allegations, but was the result of indepth inspections performed during the allegation review, which identified some slightly undersized welds on cable tray support structures.

The licensee supported the inspectors' efforts to resolve the allegations. This support involved an extensive effort on the licensee's part in providing personnel (engineers, craftsman, QA/QC inspectors, and management) to assist the inspectors and perform reinspections and analysis of hardware questioned in the allegations. Corporate management was directly involved in these activities. Decision making in these activities was at a level which ensured adequate management review. Records were complete, well maintained, legible and retrievable. The licensee's approach to resolution of the allegations from a safety standpoint demonstrated a clear understanding of the issues, and a technically sound, conservative and thorough approach. Responsiveness to NRC initiatives resulted in timely resolution of the allegations. A violation pertaining to improper design verification practices was identified, indicating that better controls may be needed in this area to prevent similar weakness in the design verification program in the future. In consideration of the extensive NRC effort conducted in this review, the violation appears to be the result of a weakness in the licensee's program.

In the area of construction quality assurance, inspectors specifically reviewed the following areas: in-depth quality assurance (QA) inspection of performance, licensee management of QA activities, and licensee actions on previously identified inspection findings.

An in-depth QA inspection of performance reviewed activities related to work procedures, field inspection, quality control (QC), materials and equipment, QA surveillances and audits identified that on going work in these areas was satisfactorily being performed.

The licensee management of QA activities reviewed areas related to nonconformance controls, procedure reviews, QA trend data, and audits. A problem was identified in that craft personnel continued to perform work without using appropriate procedures. This was identified by QA/QC and construction inspection personnel, but management consistently failed to provide adequate corrective action. Management attention in this area significantly improved following discussions with NRC Regional Management. Further corrective actions included retraining craft personnel and supervision of individuals identified who were involved in unauthorized work. Additionally, regularly scheduled training classes were established, where craft supervision stressed the importance of following procedural controls and performing quality workmanship. The number of instances involving unauthorized work practices significantly decreased following the supplemental training.

During the previous SALP period, a weakness was identified in the licensee's electrical inspection program and in the site corrective action program. Licensee management met with RII management on July 30, 1986, and August 29, 1986, where the resolution and status of electrical separation problems at Harris were discussed. Subsequently a Severity Level III violation was issued during the current assessment period for the licensee's QA program failing to take sufficient corrective action for electrical separation deficiencies which had been previously identified. Regional inspection personnel conducted follow-up inspections and found that the licensee had provided sufficient corrective action for the electrical separation deficiencies. The licensee has also implemented site procedures which should prevent any future electrical separation problems. This violation is listed as one of the four below.

The remaining three violations resulted from: Licensee management failing to require adequate corrective actions to preclude unauthorized work, licensee QA/QC inspectors' failure to identify undersized welds on electrical cable tray supports and failure to protect permanent plant equipment during construction. These violations indicated a weakness in the licensee's ability to identify and correct deficiencies, especially in the electrical area of construction. Licensee management placed more emphasis on documenting, correcting and trending nonconforming conditions, and improvements were observed.

Four violations were identified.

a. Severity Level III violation for failure of the Q.A. program to identify all electrical separation deficiencies. (400/86-66-01)

b. Severity Level IV violation for failure of licensee management to implement adequate corrective actions to preclude unauthorized work. (400/86-65-01)

c. Severity Level IV violation for failure of the licensed QA/QC inspectors to identify the undersized welds on cable tray supports. (400/86-77-02)

d. Severity Level IV violation for failure to protect permanent plant equipment during construction activities. (400/86-69-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Major activities for the Harris Plant included the satisfactory completion of construction, preoperational testing, fuel loading, initial criticality, low power testing, fuel power testing and the declaration of commercial operations. Emergency systems functional testing was completed between September 16, 1986 and October 8, 1986. The Operations Site Security program was implemented on October 6, 1986, the site received a low power operating license on October 24, 1986, and fuel was loaded between November 17 and 21, 1986. The plant achieved initial criticality on January 3, 1987, and received a full power operating license on January 12, 1987. The full power test program began on February 17, 1987 and was completed on May 20, 1987. The licensee declared the plant ready for commercial operation on May 2, 1987.

The Institute of Nuclear Power Operations (INPO) conducted an evaluation during May and June 1987 to make an overall determination of plant safety, management systems and controls, and to identify areas which may need improvement.

During April, May and June of 1987 plant modifications required the addition of check valves in the auxiliary feedwater system between each of the pump discharge lines and each associated steam generator. These modifications were implemented to reduce the potential for back leakage through the original design installed check valves.

To enhance the interface which the overall security program has with site personnel and to improve the efficiency of the program, numerous changes were implemented which included:

Reorganization of certain supervisory positions on the security force;

Additional security awareness training for plant personnel;

More frequent publication of site distributed security pointers in the monthly station newsletters;

Weekly training for members of the security force (various security topics);

More frequent drills and exercises for members of the security force;

Reevaluation of posted instructions on security barriers to further clarify security requirements;

Assignment of additional post patrols to increase security coverage;

Development of additional tactics and firearms training.

The licensee formed a task force, which included various technical disciplines, and conducted a comprehensive evaluation of the cause of the secondary system trips, and as a result of this effort, certain modifications or adjustments have been made to reduce the likelihood of plant trips. The licensee is presently continuing this effort over the long term to determine what other steps may be taken to further minimize secondary system initiated trips. After the licensee implemented the adjustments to the secondary system, there has been a noticeable reduction in the number of reactor trips which were initiated by secondary system main feedwater transients.

B. Inspection Activities

During this assessment period, routine inspections were performed at the facility by both the resident and regional inspection staffs. Additionally, several special team assessments and inspections were conducted:

August 25 - 28, 1986, in the area of electrical separation concerns

September 4 - 11, 1986, a team reviewed structural steel, electrical supports, etc. from a generic standpoint involving the previously identified electrical separation problems

September 9 - December 12, 1986, a region based investigation team followed up on allegations related to design and construction activities

September 29 - October 28, 1986, a region based procedure inspection team reviewed site procedures

October 27 - 29, 1986, region based inspectors team with a limited emergency preparedness exercise

November 17 - 21, 1986, team inspection concerning the events surrounding problems with the emergency diesel generator sequencer

December 3, 1986 - January 23, 1987, region based inspection concerning the 2.206 petition

January 5 - 9, 1987, operational readiness review inspection team activities

February 26 - March 1, 1987, full emergency preparedness exercise

C. Investigation Review

NONE

D. Escalated Enforcement Actions

1. Civil Penalties

NONE

2. Actions Pending/Resolved

NONE

3. Orders

NONE

4. Enforcement Conferences

QA/Cable Separation/Structural Steel (SL III, No CP)	10/9/86
Vital Area Barrier - Plug/Ducting (SL III, No CP)	2/4/87

5. Confirmation of Action Letters (CALs)

NONE

E. Management Conferences

8/29/86	Management meeting, Region II, resolution status of cable separation problem
9/9/86	Management meeting, Harris, NRR and Region II senior management operational readiness tour and briefing
9/15/86	Chairman Zech tour and briefing
9/25/85	Management meeting, Region II operational readiness and remaining construction activities tour
9/30/86	Management meeting to discuss results of SALP, Raleigh, N.C.
10/6/86	Commissioner Carr tour and briefing
12/18/86	Management meeting, Harris, NRR and Region II attend full power licensee tour and briefing and discuss information with 2.206 anonymous alleger

1/5/87	Commissioner Asselstine tour and briefing
2/4/87	Management meeting, Region II, status of plant operations
5/1/87	Management meeting, Region II, resolution of BOP transients and status of security enforcement program
6/10/87	Management meeting, Harris, NRR and Region II visit on operating experience

F. Licensee Event Report Cause Analysis

During the assessment period, 48 LERs for the unit were analyzed. The distribution of these events by cause, as determined by the NRC staff, was as follows:

Cause	Number
Component Failure	5
Design	12
Construction, Fabrication, or Installation	2
Personnel:	
- Operating Activity	18
- Maintenance Activity	4
- Test/Calibration Activity	5
- Other	2
Out of Calibration	0
Other	0
TOTAL	48

Note 1: The 'Other' category is comprised of events where there was a spurious signal or unknown cause.

G. Licensing Activities

1. Licensing Actions Completed During This SALP Period

Low power license	10/24/86
Full power license	1/12/87

2. NRR-Licensing Meetings

There were four significant meetings between the licensee and NRR during this rating period. Three of these meetings were held to discuss schedular and prioritization of licensing activities and one was a licensee management introductory meeting following the reorganization of the NRC.

3. NRR Site Visits

PM Unescorted Access recertification	6/8/87
Licensee/NRR and Region II to discuss overall plant operations	6/9 - 10/87

4. Commission Briefing

Full Power License	1/8/87

5. Reliefs Granted

Relief granted from requirements for certain preservice examinations	10/86

6. Exemptions Granted

Appendix E, 10 CFR 50	1/12/87
Appendix J, 10 CFR 50	10/24/86

H. Enforcement Activity

1. Violations vs. Functional Areas

FACILITY SUMMARY

FUNCTIONAL AREA	Severity Levels D	V	IV	III	II	I
A. Plant Operations	0	0	4	0		
B. Radiological Controls	0	0	2	0		
C. Maintenance	0	1	0	0		
D. Surveillance	0	0	1	0		
E. Fire Protection	0	0	0	0		
F. Emergency Preparedness	0	0	0	0		
G. Security	0	1	5	1		
H. Quality Programs and Administrative Controls Affecting Quality	0	0	1	0		
I. Licensing Activities	0	0	0	0		
J. Training	0	0	0	0		
K. Preoperational and Startup Testing	0	0	3	0		
L. Engineering Support	0	2	2	0		
M. Construction Activities	0	0	3	1		
TOTALS	0	4	21	2		

2. Number and Severity Level of Violations

Severity Level	Unit 1
Severity Level III	2
Severity Level IV	21
Severity Level V	4
Deviations	0
Totals	27

I. Reactor Trips

Thirteen reactor trips were initiated with power greater than 15% during this evaluation period:

January 22, 1987 - Loss of the condensate pump led to the loss of the condensate booster pump and main feedwater to the S/G causing an automatic reactor trip on S/G lo-lo level from 32% power.

February 27, 1987 - Turbine load transient caused a loss of the main feedwater system, resulting in an automatic start of the auxiliary feedwater system. Attempts to restore the normal feedwater supply were unsuccessful, and the reactor was manually tripped from 49% power.

March 11, 1987 - Licensee personnel inadvertently pushed a trip test button on the turbine supervisory panel while at power, generating a trip signal for the turbine resulting in a trip of the turbine, and trip of the reactor on interlock from 47% power.

March 13, 1987 - After flushing the auxiliary feedwater system, a feedwater transient caused a loss of the main feedwater pumps, condensate pumps, condensate booster pumps, and heater drain pumps. Attempts to restore were unsuccessful and the operators manually tripped the reactor from 49% power.

March 31, 1987 - Feedwater flow control valve oscillations caused feed flow/steam flow mismatch coincident with a low steam generator level, resulting in an automatic reactor trip from 56% power.

April 3, 1987 - While working in a process instrument cabinet a maintenance person inadvertently tripped the running main feedwater pumps, creating a low S/G level condition. Operators manually tripped the turbine, resulting in an automatic reactor scram from 75% power.

April 12, 1987 - On a condensate pump high discharge temperature the turbine load was reduced causing the steam dump system to open; subsequently loss of the condensate system on high temperature led to the loss of the associated feedwater train. Steam demand requirements were greater than the feed capabilities of the remaining feedwater train, and therefore it tripped. The operators manually tripped the reactor from 75% power to place the plant in a stable condition.

April 14, 1987 - During cleaning of the circulating water pump suction strainers, cooling tower material was admitted to the

circulating water system which caused flow restrictions. Condenser temperature increased rapidly, tripping the condensate pumps. Loss of the running condensate pumps led to the loss of both main feedwater trains and the operators manually tripped the reactor from 87% power.

April 21, 1987 - Loss of the heater drain pumps on low differential pressure caused a turbine runback; during the runback the plant experienced a loss of both main feedwater pumps. The operators manually tripped the reactor from 100% power.

April 22, 1987 - While at 99% reactor power, the plant lost a heater drain pump on low flow signal. The operators generated a turbine runback to compensate for the loss of the heater drain pump. However, during the runback the other heater drain pump tripped off, resulting in a loss of both feedwater trains. The operators manually tripped the reactor.

May 24, 1987 - Loss of a heater drain pump at 100% power required the operators to initiate a turbine runback. During the runback, the other heater drain pump was lost, resulting in a loss of all feedwater to the S/Gs. The operators manually tripped the reactor.

June 17, 1987 - Personnel moving a cart in the area of the reactor coolant pump breaker inadvertently bumped the cabinet, resulting in tripping the breaker for the reactor coolant pump "C". Loss of the reactor coolant pump automatically tripped the reactor plant from 100% power.

June 21, 1987 - Loss of the running condensate pump, condensate booster pump and main feedwater pump, with subsequent failure to restore required the operators to manually trip the reactor from 30% power.

Two reactor trips occurred with reactor power less than 15% as identified below:

January 21, 1987 - While reducing power to 10% the reactor automatically tripped due to a low reset value for the intermediate power range channel.

June 22, 1987 - The turbine generator tried to assume an excessive load when tying to the grid, causing a S/G hi-hi level condition, tripping the turbine generator and reactor from 6% power on interlock.

Two reactor trips occurred with the unit subcritical as indicated below:

December 6, 1986 - During power ascension testing of the digital rod position indication system at 0% power, the licensee

recognized that the plant was not in compliance with Technical Specification 3.10.5, and immediately opened the reactor trip breakers.

January 11, 1987 - While in hot standby, the licensee was performing repairs on data "A" input channel of the Digital Rod Position Indication system, the operators received indication of a failure of the data "B" input channel, requiring that the operators manually trip the reactor.

C. Investigation Review

NONE

D. Escalated Enforcement Actions

1. Civil Penalties

NONE

2. Actions Pending/Resolved

EQ potential escalated enforcement

3. Orders

Denial of Equipment Qualification Schedular Exemption	11/15/85

4. Enforcement Conferences

Chlorine Detector Problem	2/19/86

5. Confirmation of Action Letters (CALs)

NONE

E. Management Conferences

Management meeting to discuss results of SALP (Harris Enviormental and Emergency Center, Raleigh, N.C.)	January 23, 1986

F. Licensee Event Report Cause Analysis

During the assessment period, 65 LERs for Unit 1 and 38 LERs for Unit 2 were analyzed. The distribution of these events by cause, as determined by the NRC staff, was as follows:

Cause	Unit 1	Unit 2	Total
Component Failure	14	9	23
Design	6	3	9
Construction, Fabrication, or Installation	0	3	3
Personnel:			
- Operating Activity	13	5	18
- Maintenance Activity	9	6	15
- Test/Calibration Activity	12	4	16
- Other	5	2	7
Out of Calibration	0	1	1
Other	6	5	11
TOTAL	65	38	103

NOTE 1: The 'Other' category is comprised of events where there was a spurious signal or unknown cause.

NOTE 2: LER 1-86-19 was voluntary and was included as personnel-maintenance.

LER 2-86-03 was voluntary and was included as component failure.

Part 21 Reports

June 30, 1987, in LER 1-87-018. Undersized spring packs were supplied by Limitorque in the RHR system full flow test line valves' motor operators.

G. Licensing Activities

The assessment on licensing activities was based on licensing actions which included the following:

- ISI Relief Granted (12/19/85)
- Exemption from Sections III.G and J of Appendix R Granted
- Exemption from certain requirements of Appendix J Granted
- Hydrogen Recombiner, Generic Letter 84-15 Review
- Mark I Drywell Vacuum Breakers, Generic Letter 83-08 Review
- IGSCC Inspection Programs, Generic Letter 84-11 Review
- Unit 1 License Amendments Issued (seventeen)
- Unit 2 License Amendments Issued (nineteen)

Significant Amendments included:

- Diesel Generator Reliability TS, Generic Letter 84-15
- Control Rod Block Instrumentation
- RCIC Steam Isolation Time (Emergency Amendment)
- Hydrogen Water Chemistry Preimplementation Test
- Unit 1 and Unit 2 Core Reloads
- Core Spray System Operability
- Chlorine Detection System
- Unit 1 Standby Liquid Control System - ATWS Modifications

Meetings were held regularly with the licensee staff to discuss the the status and schedule for completion of licensing actions. In addition, meetings were held with the licensee to discuss and work toward the resolution of the following technical issues:

- Hydrogen Recombiner
- Unit 2 Reload
- Unit 2 IGSCC Program
- Fire Barrier Penetration Seals
- IGSCC Repair (pipelocks)

H. Enforcement Activity

1. Violations vs. Functional Areas

FACILITY SUMMARY

FUNCTIONAL AREA	Severity Levels D	V	IV	III	II	I
Units	1/2	1/2	1/2	1/2	1/2	1/2
A. Plant Operations		3/4	2/1			
B. Radiological Controls			1/1			
C. Maintenance			2/2			
D. Surveillance			1/1			
E. Fire Protection			3/3			
F. Emergency Preparedness		1/1				
G. Security			1/1			
H. Outages		3/2	0/4			
I. Quality Programs and Administrative Controls Affecting Quality			1/1			
J. Licensing Activities		0/1				
K. Training						
TOTALS		7/8	11/14			

2. Number and Severity Level of Violations

Severity Levels	Unit 1	Unit 2	Total
Severity Level III	0	0	0
Severity Level IV	11	14	25
Severity Level V	7	8	15
Deviations	0	0	0
Totals	18	22	40

I. Reactor Trips

Unit 1

Five scrams with power greater than 15% occurred during this evaluation period:

March 26, 1986 - Freeze seal relaxed in control rod drive piping caused hydraulic pulse through differential pressure cells, perturbing vessel level instruments, resulting in a turbine trip from 100% power.

April 2, 1986 - Feeder breaker from unit auxiliary transformer to station 1D bus opened for unknown reasons, resulting in a loss of the only running feedpump and a reactor scram on low level (level one) from 47% power.

August 19, 1986 - A flange gasket steam leak grounded a main steam bypass valve limit switch, blew a fuse, tripping the turbine and scramming the reactor from 100% power.

September 13, 1986 - Oxide film on the main generator manual voltage regulator potentiometer caused emergency bus voltage fluctuations, momentary loss of the emergency buses, resulting in a turbine trip and reactor scram from 100% power. HPCI flow oscillations occurred during the event and RCIC declared inoperable after transient.

November 16, 1986 - A misconfigured main generator stator cooling temperature control valve resulted in a turbine runback. The turbine runback occurred faster than designed due to a relay failure, resulting in a reactor scram on high pressure from 95% power.

Three scrams occurred with reactor power less than 15%:

November 2, 1985 - Auxiliary operator checked instrument drain valve position in wrong direction, causing a reference leg perturbation, resulting in a Group 1 isolation and reactor scram at 6% power. RCIC tripped, maybe due to trip and throttle valve unlatching. Diesel Generator No.4 tripped on low lube oil pressure.

May 6, 1986 - During a startup with reactor critical, the startup level control valve caused a rapid 7 inch level increase that the operator was investigating when the Intermediate Range Monitor (IRM) upscale trip occurred. The operator had not ranged up the IRMs during his investigation of the level problem.

September 17, 1986 - Circulating water intake pumps tripped when a leak flooded the condenser pit. The operator manually scrammed the reactor at 1.5% power since the normal heat sink was lost.

Three scrams or reactor protection system actuations occurred with the unit subcritical:

August 21, 1986 - While the reactor was subcritical in source range, IRM upscale trip of unknown origin occurred.

April 30, 1987 - With the reactor shutdown, warmup flush procedures were not followed on Reactor Water Cleanup system, resulting in a low level (level one) reactor scram signal.

May 15, 1987 - A maintenance surveillance test inadequacy led to a reactor protection system actuation with the rods already inserted.

Unit 2

Five reactor scrams with power greater than 15% occurred during this evaluation period:

November 22, 1985 - The reactor automatically scrammed from 70% power on average power range monitor high trip. No cause was found.

June 18, 1986 - A failed open feedwater discharge check valve diverted flow from the reactor through the feedwater recirculation line, causing a reactor scram on low level (level one).

August 23, 1986 - An instrumentation & control (I & C) technician improperly returned an instrument to service, causing a reference leg perturbation, resulting in a reactor scram from 99% power on a group 1 isolation.

January 5, 1987 - Dirty or corroded wipers on main generator automatic and manual voltage regulators caused a main generator lockout and resulting scram and group 1 isolation from 100% power. HPCI injection valve failed and RCIC flow was reduced during recovery. The root cause of this event was essentially identical to the September 13, 1986 Unit 1 scram.

March 11, 1987 - An auxiliary operator missed a procedure step when directed to perform part of a procedure in reverse, de-energizing the non-safety uninterruptible power supply, causing the feedpumps to runback, scramming the reactor on low level one at 100% power. HPCI was inoperable after the scram

recovery due to thermal binding of a flow path valve that was shut for unknown reasons.

No scrams occurred with reactor power less than 15%, with the reactor critical.

Four scrams or reactor protection system actuations occurred with the unit subcritical:

April 23, 1986 - An I&C technician thought the shorting links were installed instead of removed, and the subsequent maintenance surveillance test caused a Reactor Protection system actuation with the unit shutdown.

April 30, 1986 - Control rod motion coupled electronic noise to IRMs with the shorting links removed, causing an upscale scram signal with rods already inserted during an interlock check.

July 11, 1986 - An operator failed to maintain vessel level during a flush of the RHR system, resulting in a low level one Reactor Protection system actuation signal with all rods already inserted.

January 5, 1987 - RCIC system full flow test line isolation valve failed, due to improperly installed anti-rotation device, leading to flow diverted back to the condensate storage tank, and a low level (level one) scram with all rods already inserted.

J. Effluent Summary

	1984	1985	1986
Gaseous Effluents*			
Fission and Activation Gases	1.67 E+5	1.75 E+4	4.51 E+4
Iodine and Particulates	3.5 E-1	6.33 E-2	4.69 E-2
Liquid Effluents*			
Fission and Activation Products	5.65 E-1	1.5 E-1	1.3 E-1
Tritium	3.37 E+1	3.37 E+1	5.8 E+0
Whole Body Dose			
gamma (mrem)	1.6	1.2	5.9
beta (mrad)	3.5	3.4	15.9

* In Curies