ENCLOSURE

SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBERS

50-269/87-33

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DUKE POWER COMPANY

OCONEE Units 1, 2, & 3

MARCH 1, 1986 THROUGH JULY 31, 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 October 7, 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 Oconee Units 1, 2, & 3 for the period March 1, 1986, through July 31, 1987.

B. SALP Board for Oconee Units 1, 2, & 3

Board Chairman

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

Board Members

A. R. Herdt, Chief, Engineering Branch, Division of Reactor Safety (DRS), RII
D. M. Collins, Chief, Emergency Preparedness sand Radiological Protection Branch, Division of Radiation Safety and Safeguards (DRSS), RII
V. L. Brownlee, Chief, Reactor Project Branch 2, DRP, RII
H. N. Pastis, Project Manager, Project Directorate II-3, DRP, NRR
J. C. Bryant, Senior Resident Inspector, Oconee, DRP, RII

Other Attendees at SALP Board Meeting

T. A. Peebles, Chief, Reactor Projects Section 2A, DRP, RII
K. D. Landis, Chief, Technical Support Staff, RII
P. H. Skinner, Senior Resident Inspector, Oconee, DRP, RII
L. D. Wert, Resident Inspector, Oconee, DRP, RII
S. Ninh, Reactor Engineer, Technical Support Staff, DRP, RII
B. R. Bonser, Project Engineer, Section 2A, DRP, RII
P. K. VanDoorn, Senior Resident Inspector, Catawba, DRP, RII
M. S. Lesser, Resident Inspector, Catawba, DRP, RII
D. Hood, Project Manager, Project Directorate II-3, DRP, NRR

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 were 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 judgement 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

During this SALP evaluation period, the Oconee facility was effectively managed and achieved a satisfactory level of operational safety. Strengths were noted in the areas of plant operations,

maintenance, surveillance, emergency procedures, security, and quality programs and administrative controls affecting quality. The improvement shown by maintenance is partially due to a number of programs initiated to direct maintenance philosophy toward trending, failure analysis and effective predictive and preventive maintenance. Improvements also were shown in quality programs and administrative controls affecting quality.

Improvements still are needed in implementation of the radiological control program. The program is sound but results do not always reflect aggressive implementation. Outage performance shows a decline due to failure to investigate some detected problems in sufficient depth to arrive at sound solutions. This is also reflected in the engineering support section, a new category in the SALP process. Two violations, one cited during the evaluation period is a direct result of inadequate communications between corporate and site personnel. Other events, including failure to consider actual lake water temperatures in reference to cooling units, failure to detect the effect of lake levels on emergency condenser circulating water performance and lack of in-depth evaluation of ultrasonic indications relative to reactor vessel to flange welds indicate the need of improved performance. The recently initiated "Self Initiated Technical Audits" is a positive approach to disclosing existing problems; however, there is a need for more aggressive evaluation of new issues.

B. Facility Performance Summary

Functional Area	September 1, 1984 - February 28, 1986	March 1, 1986 - July 31, 1987
Plant Operations	1	1
Radiological Controls	2	2
Maintenance	2	1
Surveillance	1	1
Fire Protection	1	2
Emergency Preparedness	1	1
Security	2	1
Outages	1	2
Quality Programs and Administrative Controls Affecting Quality	2	1
Licensing Activities	2	2
Training	2	2
Engineering Support	Not Rated	2

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

During the evaluation period, routine inspections were performed by the resident and regional staffs. On day and on night shifts operations personnel were found to be alert, professional, and attentive to their duties. Plant housekeeping has continued to improve throughout the evaluation period. The decontamination program has continued and much of the auxiliary building is now clean.

The station manager and his superintendents continue to be very involved in all ongoing activities, and are able to discuss events knowledgeably very soon after any occurrence. The station manager and operations superintendent are out in the plant at sometime almost every working day. During unusual events the inspectors have observed many managers and staff personnel, all SRO licensed or accredited, in evidence around the control room ready to assist but not interfering with the operating staff or causing any confusion. The resident inspectors are kept informed by station management of any plant anomalies and are invited to attend any meetings in progress at the plant. In general, all personnel, records, areas and information are available to the inspectors without any references to higher management. These attributes at Oconee provide good working relationships for the inspectors.

The Operations department at Oconee has continued to be stable with a very low turnover rate. In 1986, no SRO or RO licensed personnel left the company and only three non-licensed operators left. In 1987, through the end of the evaluation period, one SRO has left the company; no other operators have left. The average operations staffing level consists of 60 SRO's, 40 RO's and 70 non-licensed operators. This large pool of experience and the stability of the group have been a positive factor in plant operations.

During December 1986, an NRC contractor conducted an audit of the "Emergency Procedure Generation Package" at Oconee. While human factors deficiencies were noted and other recommendations were included in the final report, the audit team was complimentary of Operations commitment to quality emergency procedures development. Also, the team noted that operator performance during the exercises was exemplary.

Unit 1 began the evaluation period having just shut down for a refueling outage, and Units 2 and 3 were each refueled once during the period. Seven automatic reactor trips were

experienced during the period as follows: Unit 3 had no automatic trips; Unit 1 had 1 trip; and Unit 2 had six trips. Unit 3 was manually tripped once following the rupture of a reheater drain line. One of the Unit 2 trips was caused by operator error when failure to reset turbine trip contact buffers resulted in a reactor trip from 19% power during power ascension. The Unit 2 trips were caused, primarily, by electrical or instrumentation disorders in inputs to the integrated control system. The most recent Unit 3 automatic trip was on January 31, 1986, and the most recent Unit 1 trip was on May 10, 1986. The trip averages above 15% power per 1000 critical hours for the SALP evaluation period were: 0.18 Unit 1, 0.76 for Unit 2, and 0.0 for Unit 3. Only one violation against unit 1 and one violation against unit 3 were cited against operations during the evaluation period. One of these was for failure to document independent verification. The inspectors determined that the verification had actually been made. The other violation, which included escalated enforcement, was for heating up the plant in preparation for nuclear startup with the high pressure injection and reactor building cooling unit systems valved out and unable to perform their engineered safety functions automatically. Operations personnel on two shifts had opportunities to detect the improper lineup but failed to do so. An underlying cause could have been confusion caused by a change in plans concerning the shutdown of Unit 3. The reactor was shutdown due to an unisolable leak in the primary system and it was assumed that the unit must be defueled and drained. However, as the unit was being cooled down it was determined that repairs could be made without taking it completely to cold shutdown. Preparations for draining and refueling were stopped, repairs made, and heatup begun. Though the procedures in use were adequate to restart the unit without problems, there was some confusion and inadequate communication between staff and operators which contributed to the operational errors.

Oversites such as these are rare at Oconee and the event does not reflect a breakdown in performance. Two violations were cited against operations during the evaluation period as compared to six during the previous period. The violations identified during the current period were:

a. Severity Level III violation with $25,000 civil penalty for heatup of reactor with high pressure injection pump suction isolated from the borated water storage tank and reactor building cooling units valved out. (87-16, Unit 3 only)

b. Severity Level V violation for failure to document independent verification of initiation of pressurizer auxiliary spray although the verification had actually been made. (86-20, Unit 1 only)

2. Conclusion

Category: 1

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

B. Radiological Controls

1. Analysis

This area includes assessment in the areas of primary and secondary chemistry.

During the evaluation period, routine inspections of radiological controls were performed by the resident and regional inspection staffs. This included confirmatory measurements using the Region II mobile laboratory and an environmental protection inspection.

The licensee's health physics staffing level was adequate and compared favorably to other utilities of similar size. An adequate number of ANSI qualified licensee and contract health physics technicians were available to support routine and outage operations. The radiological effluents control staffing levels and staff qualifications were acceptable. Key positions in the radwaste management program and environmental surveillance programs were filled with qualified staff.

The strengths of the health physics program were the quality of the health physics technicians and the experience level of the corporate and site health physics staffs. The staff has a low turnover rate and an effective training program.

Management's support of the licensee's radiation protection program is a program strength. During the evaluation period, licensee management authorized the purchase of approximately twenty hand and foot monitors and whole body monitors for the licensee's change rooms which allowed the licensee to implement an automatic frisking program. In July 1986, a new two story Health Physics Building was occupied by various sections of the health physics staff. The 6,600 ft^2 building is adjacent to the RCA and allows quick access into the RCA. The licensee health physics staff uses the area as a staging area for equipment entering the RCA. The additional space allowed the licensee to consolidate the counting equipment into a centrally located lab for efficiency. Continued management support and resources allowed for improvements in calibration, quality control checks, maintenance, issuance, and tracking of radiation detection instruments.

The licensee's approach to resolving health physics technical issues was adequate. During the evaluation period, the licensee identified several problems with the personnel monitoring program. These problems centered around failure to conduct personnel surveys in accordance with licensee procedures. Procedure violations included failure to conduct a personnel survey or frisk, failure to frisk at the specific frisk rate and distance, and failure to survey the required areas (whole body or hands and feet). The licensee reduced the number of entry/exit access points to the radiation control area (RCA), purchased new hand and foot monitors for RCA access points to reduce the need to perform frisk with the thin-window, hand held GM tubes, and purchased new state of the art whole body monitors for the change rooms.

Weaknesses were identified in the licensee's radiation work permit (RWP) and respiratory protection program in that plant procedures failed to address the evaluation of respiratory protection requirements based on the presence of fixed and/or removable contamination in the work area. During the evaluation period a violation was issued for failure to adequately evaluate radiological hazards. While disassembling a reactor coolant pump several workers received measurable internal exposures. The licensee failed to adequately assess the potential airborne hazard based on measurements of removable and fixed radioactive contamination and allowed the work to take place without respiratory protection or adequate engineering controls to reduce the airborne hazard. The radiation work permit utilized for the coolant pump disassembly was a general RWP which allowed for various protective measures for several different tasks. Respiratory protection was required as determined necessary by the health physics technician covering the job. Upon discovering the internal exposure, the licensee changed the specific RWP to require respiratory protection for all personnel performing hands-on work. The licensee committed to include specific radioactive contamination levels (loose and fixed) in procedures; above which respirators would be required. The licensee also revised training programs to include criteria for respiratory protection.

The licensee utilized dedicated decontamination crews in contamination control efforts. In 1986 the licensee reduced by 300 ft^2 the area of the plant contaminated leaving approximately 14,000 ft^2 controlled as contaminated areas. As of July 31, 1987, the contaminated area had been reduced to 8,000 ft^2 excluding the containment buildings. This decontamination program has increased plant accessibility and has improved plant housekeeping.

During 1986, the licensee's collective dose was 949 person-rem or 316 person-rem per unit as measured by TLD. This compares

favorably to the national average exposure of 397 person-rem per unit for pressurized water reactors (PWR). Through July 31, 1987, the collective dose as measured by TLDs was 648 person-rem. The licensee's person-rem goal for 1987 was set at 1064 person-rem.

In the areas of corrosion control and plant chemistry, the licensee's major concern continued to be resolving the chemically related blockage of steam generator tube support plate openings. Considerable resources were being concentrated on the resolution of this problem including plans for chemically cleaning the steam generators in Unit 1 during the September/ October 1987 refueling outage. The licensee was implementing a program that was better than the criteria recommended for chemistry control by the Steam Generator Owners Group (SGOG). The licensee was upgrading training to implement the SGOG recommendations; having a fully trained staff with regard to operation of state-of-the-art analytical instrumentation was still to be completed at the end of the SALP period as the licensee continues to fully upgrade training of chemistry personnel.

The radiological effluent program was managed adequately. Effluent releases for 1984-1986 are summarized in the Supporting Data and Summaries, Section V.K. The licensee's effluent releases exceeded the Region II average for PWRs except for iodine and particulates during 1985. The licensee's estimated offsite doses for 1986 from radioactive liquid effluents were 1.4 mrem to the whole body. Estimated doses due to gaseous releases from 1986 were 0.087 mrem to the whole body and 0.25 mrem to the skin. These estimates place the licensee well within the limits prescribed by 40 CFR 190.10, namely, 25 mrem to the whole body over any 12 consecutive months. There were no significant trends noted in the effluent releases during the SALP period.

The licensee had identified a problem with the reliability and operability of the post accident liquid sampling system. A new system has been designed and plans are being developed for installation during subsequent outages. In the meantime, an interim backup system has been accepted until full corrective actions can be taken.

During the confirmatory measurements inspection an item was identified regarding the licensee's values for gas samples being nonconservatively biased relative to NRC data. All other counting comparisons were in agreement.

In the area of radiological environmental monitoring, the licensee was cited because the annual radiological operating report did not contain summaries of interpretations of the

results of the radiological environmental surveillance activities nor was there an assessment of the observed impacts of plant operations on the environment.

Throughout the review period off-site spent fuel shipments were transported to McGuire Nuclear Station. TO date, 188 fuel assemblies have been shipped without incident. Most of these were shipped during the review period.

During 1986, the licensee made 76 solid radioactive waste shipments totalling 8,941 cubic feet (ft^3) per unit containing 851 curies. This was above the national average of 7,448 ft^3 per unit shipped by other PWR facilities; however, this is not considered significant. Through July 31, 1987, Oconee had made 27 solid radioactive waste shipments totalling 4,940 ft^3 per unit and containing 1,672 curies of activity. During the evaluation period the licensee began operation of a sandblast facility and a liquid abrasive unit in order to reduce radwaste volume. Through May 1987 the licensee had decontaminated approximately 6,600 cubic feet of contaminated metal.

Two violations were identified.

a. Severity Level IV violation for failure to adequately evaluate radiological hazards (87-03).

b. Severity Level V violation for an inadequate environmental monitoring report (86-32).

2. Conclusion

Category: 2

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

C. Maintenance

1. Analysis

During the evaluation period, maintenance performance was inspected by regional and resident inspection staffs. The maintenance program is well organized and demonstrated satisfactory planning and priority assignment; maintenance procedures were adequate, complete and well maintained. Licensee response to resident inspector and other NRC initiatives has been satisfactory.

The licensee has established a predictive maintenance program which includes the use of state of the art techniques such as

infrared analysis, valve operator signature establishment and review, oil systems analysis and trending of component failures.

The maintenance department is well staffed and stable with a low personnel turnover rate. Mechanical maintenance has a supervisor and six mechanics on each shift, while there is an Instrument and Electrical (I&E) supervisor and four technicians on each shift. This closer working relationship, in addition to improved availability of maintenance personnel, is having a positive effect on shift performance.

The maintenance department has a planning and scheduling section for mechanical, I&E, and outage maintenance. While priorities and timing are established by the Integrated Scheduling Department, the details are handled by this 41 person section.

In addition to the scheduling section, plant maintenance has a mechanical maintenance staff of about 160 persons and an I&E staff of approximately 130. Also stationed at the Oconee site is the Duke Power Company Construction and Maintenance Department (CMD)-Southern Division, with a staff of approximately 350 persons in the maintenance portion of CMD to augment the Plant Maintenance Department. CMD also supplies vendor assistance as needed. Other off-site divisions of Duke Power Company provide assistance where appropriate. The construction portion of CMD performs modifications to the plant and also supplies, as needed, builders for scaffold erection and other such work, bringing the available work force for outages to about 1000 people. This large pool of personnel available for maintenance is a major asset.

Training of maintenance personnel is conducted at the Duke Power Company facilities near Charlotte, at the Oconee site, and at vendor training facilities where appropriate. A part of the DPC Employee Training Qualification System (ETQS), which is a formalized program including verification and documentation of skills, is evaluation of each employee by his supervisor and specific training to prepare him for work he may be assigned. The maintenance training program has been fully accredited by INPO. The previous SALP report noted that a large training facility was to be constructed at Oconee to be completed in 1987. This facility has been postponed; however, a large five story addition adjacent to the turbine building has provided greatly expanded facilities for maintenance, performance and other groups.

During the current evaluation period, several programs were initiated to direct maintenance toward a philosophy centered on failure analysis and effective preventive maintenance. Various industry indicators are used in program development. Some of the initiatives in work are as follows: technical support

programs for all major components which dictate maintenance based on trending, work history, and failure analysis; qualification of personnel to specific maintenance tasks prior to assignment of work; stabilization of the work force in that crews have performed the same outage tasks for the past six outages; an aggressive valve maintenance program; battery surveillance upgraded to meet IEEE-450 requirements although not required by technical specifications; and upgrading of procedures.

There were at least two incidents during the previous SALP period where miscommunication caused problems in the Oconee switchyard, resulting in reactor trips. To respond to these deficiencies, a Switchyard Coordinator has been established to provide improved coordination of switchyard work.

During the evaluation period one violation was cited against maintenance, as follows:

a. Severity Level IV violation for failure to establish adequate procedures to control maintenance on safety-related motor operated valves resulting in inadequate control of motor operated valve torque switch and limit switch settings. (86-16)

2. Conclusion

Category: 1

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

D. Surveillance

1. Analysis

During the assessment period, inspections of surveillance activities were performed by the regional and resident inspection staffs. The inspectors witnessed selected operational surveillances of reactor protective systems, pump and valve operations, calibration of instruments, and reviewed completed test procedures. Startup tests and low power physics testing were witnessed. During outages, the inspectors witnessed and/or reviewed inservice inspection activities, reactor vessel examination, performance testing of pumps and valves, and tendon and snubber surveillance.

Procedures continue to be written in sufficient detail that the personnel conducting the procedures can perform the procedure

without difficulty. Completed procedures consistently receive an effective, thorough review, with deficiencies identified and corrective actions taken. One exception to this was identified and is discussed in more detail below. If problems are observed during the conduct of a surveillance procedure, senior management is informed and prompt action is initiated to correct the problem and retest the system or component where required.

The integrated scheduling group which was established during the last assessment period is functioning well at this time. This group schedules and coordinates extended and short duration outages to assure effective use of resources, however, the individual groups still do the specific job planning. The personnel in this group are very familiar with the effect that surveillances have on operating units.

The inspectors witnessed selected surveillance activities and reviewed surveillance test procedures developed to determine the heat transfer capability, and thus, the operability of components serviced by the low pressure service water (LPSW) system. The quality of the procedures in use was found to be good. There was evidence of prior planning, assignment of priorities, and coordination among various licensee organizations at the site and at the General Office. A violation cited during inspection of the LPSW system is listed under Engineering Support.

There was management involvement in the efforts to resolve the low pressure injection (LPI) and reactor building cooling units (RBCU) heat exchanger fouling concerns. As a result of fouling problems identified at the McGuire nuclear plant, the licensee began reviewing the LPSW system at Oconee in order to determine whether or not there was a fouling problem with components serviced by the LPSW system. The licensee demonstrated conservatism in the approach to resolving this problem in that the heat transfer capability of the heat exchangers was evaluated. Determining operability of the LPI and RBCU heat exchangers based on heat transfer capability exceeded requirements. The normal practice of determining operability was by verifying that there was adequate LPSW flow through the heat exchangers, and thereby, assuming the components were capable of performing their safety function. Further discussion on the results of this testing is discussed the Engineering Support Section.

An area where nonconservatism was demonstrated during resolution of the heat exchanger fouling problems was that the maximum design LPSW inlet temperature used in the analyses (75°F) was less than the maximum temperature (approximately 82°F) that the LPSW system has reached over the years.

Review of this area showed that higher LPSW inlet temperature had not been evaluated to determine the impact on plant operations and components serviced by the LPSW system. The LPSW inlet temperature has exceeded the design value of 75°F for various lengths of time 9 of the past 11 years. The licensee was cited on this problem. The Severity level IV violation was issued after the end of this SALP period, but is considered in this period.

In the review period, the regional inspectors witnessed two integrated leak rate tests: Unit 1 in May 1986 and Unit 3 in March 1987. Management involvement was evidenced by the formalized test controls and the participation of corporate engineering in the performance of the tests. Planning and assignment of responsibility were evident in the test preparations and test procedures. A technical problem was identified during the Unit 1 test when instrumentation problems resulted in a discontinuity in the mass data which the licensee failed to recognize. Consequently, the test was terminated on the basis of an incorrect leak rate analysis. Although, subsequent reanalysis of the data showed that the test did meet the acceptance limits, this problem might have resulted in rerunning the leak rate test. An improvement in the performance of leak rate testing was observed in the Unit 3 test in that personnel were more sensitive to the test behavior, instrumentation problems were largely eliminated, improved data reduction and monitoring techniques were implemented, and a more sensitive data acquisition system was installed to improve the accuracy and quality of the test data.

One violation was identified in the surveillance area during the assessment period. This was associated with a failure to perform an adequate review of a completed surveillance procedure. The procedure identified a valve that did not meet the required acceptance criteria stated in the procedure but was not identified by the individual performing the test, nor was it detected by the management review. This failure did not cause a system inoperability since the valve is normally open and was open during the interval from completion of the test to subsequent testing.

The one violation cited against surveillance is listed below:

> Severity Level IV violation for failure to properly evaluate data during valve surveillance testing. (86-18, Unit 1 only)

2. Conclusion

Category: 1

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

E. Fire Protection

1. Analysis

During this assessment period, inspections were conducted by the regional and resident inspection staffs of the licensee's fire protection and fire prevention program including a review of the implementation of the safe shutdown and related fire protection requirements of 10 CFR 50 Appendix R.

The Appendix R inspection was conducted near the end of this assessment period by a team inspection group. This inspection reviewed the following areas: the Oconee safe shutdown analysis; random sample of cabling routes and components associated with the dedicated safe shutdown facility (SSF) to determine the adequacy of the separation afforded to the SSF and both redundant trains of normal essential hot standby systems; fire protection features provided for the shutdown components and associated cables; associated circuits for shutdown components and associated cables; shutdown circuits fuse and breaker coordination; and emergency shutdown procedures available for use in the event of a fire.

Based on areas reviewed, the inspection verified that the plant design and available fire protection and operational features are sufficient to assure that either the dedicated SSF or one train of normal plant hot shutdown systems can be maintained free of fire damage to permit the plant to be shut down following a fire, except that in the east penetration room cabling for the reactor coolant letdown valves were routed such that a fire in this location could result in the loss of reactor coolant inventory in excess of the makeup capacity. This item was identified as a violation. The licensee took prompt corrective actions to remedy any potential problems which might have occurred in the event of a plant fire. Actions included closing the appropriate valves and de-energizing the power supply to the motor operators for the valves involved. The cause of the violation was the use of incorrect engineering assumptions when the Appendix R fire protection/safe shutdown analysis was prepared. Another example of a weak fire hazard analysis was identified during the review of spurious operations. The analysis failed to consider circuit failure modes which could cause spurious operation of valve operator motors for the decay heat removal suction isolation valves. An after-the-fact licensee analysis indicated that simultaneous opening of the valves would not take place during a fire, therefore, enforcement action was not taken. It was noted that

the plant staffing and training in the use of the dedicated safe shutdown facility was good.

For the routine program, the licensee has issued procedures for the administrative control of fire hazards within the plant, surveillance and maintenance of the fire protection systems and equipment, and organization and training of the fire brigade. These procedures were found to meet the NRC requirements and guidelines.

The staff inspectors reviewed the licensee's implementation of the fire protection and administrative controls. General housekeeping and control of combustible and flammable materials were satisfactory.

The fire protection extinguishing systems, detection systems, fire barriers and fire barrier penetrations were found to be in service or the appropriate limiting condition for operational requirements of the Technical Specifications had been implemented. Surveillance inspections, tests and maintenance of the fire protection system and features were satisfactory.

Organization and staffing of the plant fire brigade met the NRC guidelines. The training and drills for the brigade members met the frequency specified by the procedures and the NRC guidelines.

Management involvement and control in assuring quality in the fire protection program is evident due to frequent involvement in the site fire protection program and well developed, issued and implemented fire administrative and emergency procedures. The licensee's approach to resolution of technical fire protection issues indicates an understanding of issues and is sound and timely. The responsiveness to NRC initiatives were technically sound and thorough.

Fire protection related violations are rare. However, when violations do occur, effective corrective action is promptly taken.

One violation was identified during this assessment period.

> Severity Level III violation for failure to provide the alternative shutdown capability with the required independence of cabling for the reactor coolant letdown valves. (87-02) (Licensee has outstanding request for reduction in severity level)

2. Conclusion

Category: 2

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

F. Emergency Preparedness

1. Analysis

One inspection was made by the regional staff addressing implementation of the radiological emergency plan and procedures, and observation of one annual radiological emergency exercise. Five emergency plan revisions were reviewed.

The annual emergency preparedness exercise disclosed no adverse findings regarding the licensee's emergency organization and staffing. An adequately staffed corporate emergency response and planning organization routinely provided support to the plant. Key positions in the corporate and plant emergency response organizations were filled. Corporate management continued to demonstrate a strong commitment to maintenance of an effective emergency response program. Corporate management was also directly involved in the 1986 annual emergency preparedness exercise and respective critique. The licensee continues to promptly and effectively respond to the NRC initiatives regarding emergency preparedness issues, as demonstrated by implementation of required corrective actions, improvements, and changes in response to routine inspections and annual exercise findings.

During the annual emergency exercise, the licensee continued to demonstrate that the emergency preparedness plan and procedures could be effectively implemented. It should be noted that no major findings requiring corrective actions were identified by the NRC. The medical drill, conducted as part of the exercise, however, disclosed that improvements in health physics practices and contamination control involving onsite and hospital emergency treatment of the injured person were required. These findings were documented by the licensee who committed to implement required corrections. Five Emergency Plan revisions were reviewed. These Plan changes did not degrade the effectiveness of the Plan. The inspection conducted during this assessment period disclosed no adverse findings.

The Oconee Emergency Plan and Emergency Response organization are tested in about ten drills a year. The resident inspectors participate in, or witness many of these drills. Drills include actions such as setting up the TSC/OSC, site assembly, table top drills with participation of off-site agencies, backshift response, weekend response and simulator use. Critiques are conducted after each drill and corrective action taken as indicated. The Emergency Response organization has been

developed around plant positions which have the authority and responsibility to accomplish assigned tasks.

The site uses a drill scenario team to plan the drills that will be held. The team is composed of the following:

- Station Emergency Planner
- Integrated Scheduling (Senior Reactor Operator)
- Operations (SRO Engineer)
- Health Physics (Associate Level)
- Chemistry (Supervisor)
- Contract Services (Technical Associate)
- Administrative Services (Supervisor)
- Maintenance (Supervisor)
- Performance (Engineer)
- Visitor's Center (Supervisor)
- Operations Production Support Training (Supervisor)

The major drills are developed around the simulator to provide positive training and to test the mitigation strategy and communications between the TSC and OSC with a minimum of message sheets. Data from the simulator can be received in the TSC and OSC and in the same format as would be received in an actual emergency.

The NRC staff has been favorably impressed with the serious approach to the scenarios demonstrated by the participants.

There were no violations or deviations identified against emergency preparedness.

2. Conclusions

Category: 1

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

G. Security

1. Analysis

During this evaluation period, inspections were performed by the resident and regional inspection staffs. The eight inspections of the security program included two special inspections, both of which related to a licensee reported Security Event that occurred in the licensee's corporate offices.

The staffing level of the licensee's security management function and of the contract security force were adequate to

fully implement required security measures. Licensee security management had increased their awareness of, and involvement in the activities of the security force and had shown an innovative approach to solving security problems. The security organization continues to benefit from the employment of a consultant who continually audit the contract security operational activities and resolve licensee identified issues. The audit and monitoring of security force performance is further reinforced by the Contract Compliance Review Program established within the contract security force.

The licensee's ability to effectively plan and implement a security program and resolve security issues was demonstrated by the completion of a major improvement program. This included a new Central Alarm Station and a fully redundant Secondary Alarm Station, which had not existed previously. In addition, approximately 25 percent of the protected area perimeter was equipped with new intrusion alarm equipment and closed circuit television cameras.

The operational capability of the contract security force benefited from an effective training program, quality assurance efforts, and managerial support at both the plant and corporate level. During the evaluation period the security training and recertification program was restructured and efforts initiated to computerize training records.

During the evaluation period, an event occurred in the licensee's corporate offices that involved the inadequate destruction of safeguards information which had a potential adverse impact on the Oconee nuclear station security program. The event and resulting impact were discussed during an enforcement conference in the Region II office. The licensee initiated corrective actions which included revision of applicable procedures and retraining of personnel.

Responsiveness to NRC Information Notices and other concerns was adequate. In response to newly established regulatory requirements, the licensee implemented a program to fingerprint employees as a prerequisite for unescorted access. This was accomplished jointly by Corporate and Site Security staffs and is indicative of the licensee's responsiveness to NRC initiatives.

Three violations were identified during the evaluation period, one of which related to the safeguards event that occurred in the licensee's corporate offices. The two violations identified at the Oconee site were not indicative of a programmatic problem. The licensee was responsive and promptly initiated adequate corrective actions.

a. Severity Level IV violation for inadequate protected area barrier (86-28).

b. Severity Level IV violation for inadequate destruction of Safeguards Information at the licensee's corporate office (87-24).

c. Severity Level V violation for issuance of an inadequate security picture badge (86-22).

2. Conclusion

Category: 1

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

H. Outages

1. Analysis

During the evaluation period, routine inspections were performed by the resident and regional inspectors. All three units were refueled once during the evaluation period and there were 14 shutdowns for maintenance during the period. The inspectors reviewed the integrated shutdown schedules and inspected procedures, prerequisites and activities concerning refueling. They also witnessed various portions of the maintenance activities including rebuilding of reactor coolant pumps (RCP); removal of RCP debris from the primary system of Unit 3; sludge lancing and water slap cleaning of once through steam generators (OTSG); motor operated valve operator testing and rework; mechanical penetration leak rate tests; and overhaul of a main generator rotor including removal of all copper winding material and adding insulation strips upon reassembly.

The large work force available for outages is discussed in Section C, Maintenance. Training of CMD personnel has continued. Qualification of personnel to specific tasks prior to assignment of work has enhanced performance.

The licensee has initiated a number of programs to enhance outage performance. Some of these are as follows:

a. Improved methods of handling OTSG tube leak outages to provide quicker, surer methods of identification, handling of leak detection gases and maintenance of wet layup.

b. Use of craft workers trained to work as HP technicians in some plant areas (outside the reactor building and in areas

less than 100 mr/hr). This has reduced the number of vendor technicians needed by 15, has provided better working relations, and coverage quality has not been compromised.

c. Detailed decontamination of the reactor building has resulted in fewer contamination cases and, an some cases, reduced dress requirements.

d. Use of the shift engineers (SRO's) as backshift outage managers has enhanced performance. Though their primary function is to serve as STA's if needed, these degreed SRO's have the authority to establish priorities, make schedule revisions, and in general, to expedite the work.

e. The integrated scheduling group (ISG) has taken an active role in the handling of critique items and is working toward identification and elimination of repetitive outage problems.

f. Use of computer scheduling provides a means to examine several methods of performing a particular job in order to provide an optimum critical path.

These initiatives and others show a determination by the licensee to improve outage performance by careful planning and adjustment to changing conditions. In the most recent Unit 3 outage this system was put to the test when it was found that all four reactor coolant pumps had to be removed for maintenance and repair rather than just the two that were scheduled.

Unscheduled shutdowns for maintenance during the evaluation period were as follows:

a. On 5/3/86, Unit 1 was shut down from 15% power on refueling startup to balance a reactor coolant pump.

b. On 5/9/86, Unit 1 was shut down from 70% power to repair a reactor coolant leak of about 1.2 gpm.

c. On 5/16/86 and 8/16/86, Unit 1 was shut down to repair steam generator tube leaks.

d. On 10/2/86, Units 1 and 3 were each shut down from 100% power when the ECCW system was declared inoperable. Unit 2 was already down in refueling shutdown.

e. On 2/21/87, Unit 1 was shut down in order to replace the main stepup transformer.

f. On 5/19/87, Unit 1 was taken to hot shutdown to repair an oil leak on the main stepup transformer and to degas the transformer.

g. On 1/8/87, Unit 2 was shut down in order to investigate a low level noise detected by the loose parts monitor.

h. On 4/8/87, Unit 2 was shut down to clean decay heat removal coolers and to repair a primary system leak from the Reactor Vessel Level Indicating System instrumentation.

i. On 10/24/86, Unit 3 was shut down from 8% power to add oil to a reactor coolant pump.

j. On 10/25/86, Unit 3 was shut down to repair an oil leak on a reactor coolant pump.

k. On 4/14/87, Unit 3 was shutdown from low power to repair a bad phase pot fuse and to balance turbine bearings.

l. On 4/23/87, Unit 3 was shut down from 100% power to repair a steam generator tube leak.

Despite sludge lancing and water slap cleaning of steam generators, Unit 2 has operated at reduced power a large part of its current run due to high steam generator levels. Also, several reactor trips were directly related to the high levels. Unit 1 probably would have experienced the same problem had power not already been reduced due to main stepup transformer problems. As a result of these difficulties, the licensee has constructed a large facility for chemical cleaning of steam generators. This is being used during the Unit 1 refueling outage which began September 2, 1987. Unit 2 SG's will also be chemically cleaned during a refueling outage scheduled for February 1988.

Inservice inspection (ISI) activities for Units 1 and 3 were reviewed by regional based inspectors. During the Unit 1 outage in early 1986, ultrasonic indications were reportedly found in the reactor vessel, in the area of the vessel flange to shell weld. The discovery of these indications raised questions about that examination and previous examinations of the reactor vessel.

The licensee's initial resolution for the problem of the reported reactor vessel indications was to label them as real, service inducted indications and then justify continued operation through fracture mechanics analysis. This approach was considered to be the most expedient and most conservative by the licensee. After meetings with NRC, the licensee agreed to perform additional review of the ultrasonic procedure which

discovered the indications, using a mockup reactor vessel flange weld at the Babcock and Wilcox Mount Vernon Facility.

Other activities inspected by the Regional staff included eddy current examination of steam generator tubes, repair welding and welding QC programs, and resolution of IE Bulletin issues such as IEB 79-14, IEB 83-05 and IEB 83-06.

Based on these inspections, the staff found that for the most part, the Oconee programs are staffed by dedicated, well-trained people. The procedures and equipment used for ISI and other outage related work are more than adequate. The weak link in the chain appears to be the perceived reluctance of engineering support to take the additional steps necessary to fully resolve technical issues. This was manifested during the discussions between Duke and the NRC on the ultrasonic indications in the Unit 1 reactor vessel.

There were no violations or deviations identified against outages.

2. Conclusion

Category: 2

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

I. Quality Programs and Administrative Controls Affecting Quality

1. Analysis

During the assessment period, inspections were performed by the resident and regional inspection staff.

For the purpose of this assessment, this area is defined as the ability of the licensee to identify and correct their own problems. It encompasses all plant activities as well as those corporate functions and personnel that provide services to the plant. The plant and corporate staff have the responsibility for verifying quality. The rating in this area specifically denotes results for various groups in achieving quality as well as the QA staff in verifying that quality.

One inspection was performed by the regional staff which was essentially directed at the resolution of a NUREG-0578 commitment which involved the addition of test circuitry to facilitate Technical Specification required periodic testing (PT) of the control oil pressure switches in the emergency feedwater pumps (EFWP). While the licensee had not been prompt

with the processing or implementation of the modification, the administrative controls placed on the use of jumpers during the performance of the associated PT was adequate. The licensee's engineering staff was aware of the delays in the implementation of the modification, but appeared confident the interim measures in effect would preclude the misuse of jumpers.

During routine inspections by the resident staff, the inspectors have noted increased attention by the individual departments to improve performance in all respects. Some of these initiatives are described in the various individual sections of this report. These, and others not described, include: initiatives in the maintenance department to have well trained people on every job and to improve preventive maintenance to anticipate problem areas; QA surveillance personnel receiving basic nuclear operations training at the Duke Power Technical training center; formation of the Self Initiated Audit Teams; use of degreed SRO's as outage coordinators around the clock; and an improved problem investigation process to analyze all events for underlying causes. The addition of senior SRO's to the Compliance staff has had a beneficial effect on that organization.

The inspectors have noted consistent presence and participation of station management at shutdown planning sessions, and the openness of these sessions to encourage comments from anyone in order to eliminate miscommunication. In general, the knowledgeable participation of top management and superintendents in planning sessions and critiques is very beneficial.

Station morale is good, as evidenced by the very low personnel turnover rate.

As compared with the previous SALP period, violations and reactor trips have each been reduced by approximately 50 percent. Since the number of NRC inspections remained about the same, the reduction in the number of violations is indicative of improved performance. Also, a number of the violations cited concerned conditions that have existed for many years, but which were recently identified. In general, there is evidence that there is a very real effort to improve the quality of performance in every respect.

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 observed strengths in management controls affecting quality:

1. Management has consistently allocated the necessary manpower and resources to ensure plant maintenance is well planned, executed, and implemented.

2. The initiatives undertaken by management have enhanced outage performance, with significant results achieved.

3. The licensee's Self Initiated Technical Audits (SITA) have proven effective in paralleling the NRC's SSFI inspections. The use of SITA teams could be of considerable value to plant performance and safety.

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

1. Management controls over radiation and respiratory protection have been identified as an area of significant concern.

2. Appendix R fire protection/safe shutdown analysis have been found deficient.

3. There appears to be a reluctance on the part of Engineering Support to fully resolve technical issues.

4. Licensing submittals have declined in quality and contain many errors. Management attention is needed to ensure better quality control.

There were no violations cited against Quality Programs and Administrative Controls during the current evaluation period.

2. Conclusion

Category

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

J. Licensing Activities

1. Analysis

The licensee's management continued to have frequent meetings and discussions with the NRC staff to assure there is a common understanding of safety issues and the need for timely resolution. Submittals have declined in quality, including several which were returned for inadequate descriptions for pre-noticing under a no significant or significant hazards determination. Submittals and proposed Technical Specification

contain many errors. Management attention is needed to assure better quality control. Meetings are effective with management participation evident. Participants are well prepared, knowledgeable professional and have all the necessary information for more productive meetings.

The licensee continues to exhibit excellent understanding of technical issues and has usually enclosed resolutions which have been acceptable to the Commission's staff. When resolving technical issues the licensee has generally expressed conservatism from the safety standpoint and has usually presented a sound approach to resolving issues. When proposing an approach to resolve any safety concern or to meet any regulatory requirements, the licensee has usually proposed solutions that meet the acceptable standard.

The licensee seems to follow closely the regulatory environment and takes an active role from the safety standpoint. The licensee consistently takes the lead for the nuclear industry to help resolve matters of generic concern. For example, the licensee has participated in Babcock and Wilcox Owner's Group and has proposed to participate in programs or studies that have or will be used at other utilities. An example includes participation in the Technical Specification improvement program.

NRR has met with the licensee several times during this review period. The licensee has generally been well prepared, responsive and made a concerted effort to resolve the issues. When major differing positions occurred between the staffs, the licensee was professional and endeavored to resolve all questions. Overall, the meetings were informative and productive. Some licensing issues, however, required repeated meetings and submittals over several years to obtain resolution. The licensee usually requested extensions to respond to requests for additional information. This appears to be a developing trend. Oconee Nuclear Station has been visited by various staff members and consultants for gathering information. Although under a busy schedule, The licensee has been courteous, cooperative and informative.

The overall staffing to support corporate licensing activities is adequate. The staff has good knowledge of the plant with good historical background of plant systems and program integration. Experienced individuals in the licensing staff seem to be overburdened. Licensing seems to be the training ground to newcomers who have not been indoctrinated in the regulatory environment. The more experienced individuals seem to carry the burden.

The licensee's activities relating to licensing continues to be conducted in a professional and efficient manner. Their effort for the most part is well managed. No major deficiencies affecting licensing activities became apparent during the evaluation period. The licensee does need to improve on the quality of the submittals. Also, the licensee needs to monitor the developing trend in delaying responses to requests for additional information and in proposing additional Technical Specifications requested by the NRC. The licensee's approach to the resolution of technical issues is generally sound and conservative, and the licensee is usually responsive to NRC initiatives.

With regard to reporting of operational events, it has been observed that the Licensee Event Report program at Oconee is adequate. Generally, LER submittals are made on a timely basis and contain adequate information on the event description, event evaluation and corrective actions. A recent NRC assessment of Oconee LERs indicated the overall quality has improved slightly from a previous evaluation.

2. Conclusion:

Category: 2

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

K. Training

1. Analysis

During the evaluation period, inspections were made by regional and resident inspectors. In July 1986, Duke Power Company announced a reorganization resulting in consolidation of nuclear training to be managed by the Production Training Services Group in the Production Support Department. The Production Training Services Group at Oconee consists of a training manager with directors over major functional areas. The training manager at Oconee is the former Superintendent of Technical Services who is SRO trained. This change has fully integrated nuclear training under a single responsibility. All training personnel came from the station staff.

In prior years the non-licensed operator, reactor operator, senior reactor operator, and shift technical adviser training programs were accredited by INPO. In March 1987, the remaining six training programs were accredited by INPO. These programs are I&E, Performance, Mechanical Maintenance, Health Physics, Chemistry, and Technical Staff Managers.

During the assessment period, improvements have been made in training relative to operating experience and industry events. Video taping is being used during training for crew self criticism. Also during this period, the simulator has been used extensively for the conduct of plant drills. The simulator is maintained current with plant modifications. Upgrading of procedures and the alarm response manual has continued, with procedures being validated on the simulator.

During this assessment period, a routine announced inspection was performed by regional inspectors to close out open items. In each case licensee management was responsive to the items identified and had adequately corrected the problem. The licensee was cooperative during the closeout inspection.

Operator staff training, knowledge of the facility and attitude appeared to be good. Early in the assessment period three of four (75%) candidates passed the Senior Reactor Operator retake examination. Ten of twelve candidates taking the Reactor Operator (RO) examination passed the examination on the first attempt. The two remaining RO license candidates passed on a subsequent examination. This performance is compared to that of the last rating period in which there was a 63% pass rate on SRO initial examinations and a 100% pass rate on RO retake examinations. During the two week period, of July 13-24, 1987, licensing examinations were given to both new license candidates and to requalification program participants. Results are for license candidates 50% pass rate for SRO and 70% pass rate for RO which are below industry averages. The requalification examinations resulted in a 80% pass rate for 9 SRO and 70% pass rate for 10 RO.

There were no violations or deviations cited against training.

2. Conclusion:

Category: 2

3. Board Recommendations

No change in the NRC's inspection resources is recommended.

L. Engineering Support

1. Analysis

Engineering Support is an optional category in the SALP process. It is considered in this report to include both the corporate office (Design Engineering) and the on-site support groups. Since Duke Power Company (DPC) is its own architect engineer, constructor for nuclear, fossil and hydro plants, it has a very

large, experienced engineering staff. Despite this in-house capability, DPC is not reluctant to seek outside assistance when necessary. Examples of hiring outside expertise during the current evaluation period were obtaining assistance in developing a program for calculation of heat transfer capabilities of the reactor building cooling units and run-out potential of emergency feedwater pumps.

A safety systems functional inspection (SSFI) was conducted at Oconee by an IE Headquarters team during the evaluation period. The inspection was an intensive, as-built, design review. The licensee was favorably impressed with some aspects of the inspection and considered it to be a very useful tool. Subsequently, DPC developed and trained its own "SSFI" team. This team's inspections are designated as "Self Initiated Technical Audits" (SITA).

The SITA team operates under the QA department and is composed of people from QA, Design Engineering (Mechanical, IE, Civil), Operations, Mechanical Maintenance, and Construction. This team looks at every aspect of the system being investigated including hangers, cable supports, cables, testing and preventive maintenance, in addition to design, construction and performance. The team has just completed a three week, 12 inspector, examination of the low pressure service water system at Oconee. This initiative, the use of the SITA team, could be of considerable value to plant performance and safety.

Engineering Support was assigned responsibility for a large percentage of the violations cited against Oconee during the rating period; however, some of these problems do not reflect errors made during the current evaluation period and some reflect shared responsibility even though the violations were assigned to Engineering Support. One violation listed below is still open, in that, it is being contested by the licensee. The violation is listed as cited; and the open status is indicated.

The violation listed below covering Keowee battery end gaps was due to inadequate communication from Design Engineering to the site. Although, a corrected drawing showing that end gaps should be filled was sent to the site, communication was not adequate to call attention to the change. Another violation which was not cited since it was the same problem in the same time frame concerned a considerable change in fabrication drawing style without training of site craftsmen to use the new drawings. This resulted in two weld failures in small diameter piping which caused unisolable primary system leaks. The licensee has initiated changes which should greatly reduce the chance of similar errors.

Another violation existed from the time of plant construction until it was discovered in 1986. The plant was designed to operate with Lake Keowee, the ultimate heat sink, as much as 25 feet below full pond. Tests of emergency condenser cooling water flow, through a siphon effect in blackout conditions, were conducted at each refueling outage. The tests required that flow be continued for one hour. In 1986 the test was conducted while Keowee was 13 feet below full pond. An anomaly caused the test to run more than an hour and cooling water flow stopped. Investigation revealed a joint, as designed, nine feet below full pond level that was not sealed . Air leakage would have prevented any siphon flow with lake level approaching nine feet below full pond or lower. Water flow for the first hour was simply draining of the condenser circulating water inlet line. Although this violation was assigned to engineering support since it was a design error, it is clear that adequate testing by Performance and Operations could have detected the error much sooner.

Another example of questionable performance by engineering support concerns the radiation instrument alarm (RIA-35) which monitors low pressure service water prior to its return to the Component Cooling Water line for discharge to the lake. RIA-35 has been out of service for two years and a satisfactory solution to the problem has not been determined. Grab samples have been taken every twelve hours during this period, as required by technical specifications when RIA-35 is out of service.

Two examples, one resulting in a violation, where weak engineering evaluations were performed in the area of Appendix R fire protection/safe shutdown are discussed in the Fire Protection section.

Another example of weak engineering support is discussed in more detail in the ISI activities portion of the Outage section. There appeared to be a reluctance on the part of engineering support to take the additional steps necessary to fully resolve the technical issues following the discovery of ultrasonic indications on the Unit reactor vessel.

A violation is described below concerning discovery during testing of severely degraded heat transfer capabilities of decay heat removal and reactor building cooling unit coolers. While the licensee demonstrated conservatism and initiative in evaluating the heat transfer capability of the heat exchangers, there were periods when nonconservative courses of action were taken. Some of the initial test results (which indicated that the heat transfer capability of the LPI and RBCU heat exchangers was below design specification) were considered to be questionable and unreliable. Subsequent cleaning, testing, and

evaluation showed that the initial test results gave an accurate indication of the heat transfer capability. The evaluations were performed by the licensee's Design Engineering Group at the General Office. Engineering Support failed to notice or react to the fact that actual cooling water inlet temperatures were above the design basis. As a result of the fouling problems, the licensee is developing procedures for cleaning, testing, and calculating the heat transfer capability of the LPI and RBCU heat exchangers to ensure that they will meet design specifications.

The identified violations and a deviation were:

a. Severity Level III violation with $25,000 civil penalty for failure to establish controls to assure that regulatory requirements and design bases were correctly translated into control documents in that design changes for installation of motor driven emergency feedwater pumps in 1979 did not account for pump runout or adequate net positive suction head, which were part of the design bases of the equipment. (86-16) (Denied by licensee - not resolved at the end of the evaluation period).

b. Severity Level IV violation for operation of the station when Lake Keowee level was too low to permit operation of the emergency condenser circulating water system. Violation was due to design error. (86-33)

c. Severity Level IV violation for failure to translate design requirements into specifications and control documents, resulting in Keowee batteries being installed with an end gap larger than that allowed by specifications. (86-16)

d. Severity Level IV violation for failure to provide adequate acceptance criteria to control cold spring of piping during installation. (87-01)

e. Deviation - Contrary to Section 3.7.4.1 of the Oconee FSAR, there is only one peak recording accelerometer installed and operable at the site. The five other accelerometers listed in the FSAR are inoperable and/or have been removed. (86-20).

2. Conclusion

Category: 2

3. Board Recommendations

The Board deliberated at great length before reaching a final conclusion in this functional area. A significant factor in the

Board discussion was the lack of timely communication and coordination by the Engineering staff in resolving safety significant issues; specifically, the ultrasonic indications in the Unit 1 Reactor Vessel, the LPSW inlet temperature, and the reactor building cooling unit area.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

During the assessment period, major activities included normal power operations, refueling of each of three units and extensive modifications and repairs including:

Unit 1

Repairs of steam generator tube leaks
Replacement of Main Transformer with spare transformer
Cleaning of Decay Heat Removal Coolers
MOV refurbishment program
Water Slap and sludge lancing of steam generators.
Installation of modification bypassing "BTU limit" signal to feedwater portion of Integrated Control System at high power
Installation of Reactor Vessel Level Instrumentation System (RVLIS)

The unit ended the assessment period operating at approximately 87% power as limited by reduced reactor building cooling unit and decay heat removal capabilities.

Unit 2

Installation of Reactor Vessel Level Instrumentation System (RVLIS)
Installation of new atmospheric steam dumps and modification to facilitate operation of steam dumps
Water Slap and Sludge Lancing of steam generators
MOV refurbishment Program
Refurbishment of Main Generator rotor
Cleaning and Testing of Reactor Building Cooling Units and Decay Heat Removal Coolers
Installation of modification bypassing "BTU limit" signal to feedwater portion of Integrated Control System at high power

The unit ended the assessment period operating at approximately 88% power as limited by high steam generator water level due to steam generator fouling.

Unit 3

Replacement of Moisture Separator Reheater tube bundles
Installation of new atmospheric steam dumps and modifications to

facilitate operation of steam dumps
MOV refurbishment program
Installation of Smart Automatic Signal Selector (Integrated Control System
Repairs to 3B1 Reactor Coolant Pump and cleanup of Reactor Coolant System and fuel
Repairs of steam generator tube leaks
Cleaning and Testing of Reactor Building Cooling Units and Decay Heat Removal Coolers
Installation of Reactor Vessel Instrumentation System
Installation of modification bypassing "BTU Limit" signal to feedwater portion of Integrated Control System at high power

The unit ended the assessment period operating at 100% power.

Both Units One and Three were shutdown of 2 October 1986, (and Unit Two refueling outage extended) due to the inoperability of the Emergency Condenser Circulation Water (ECCW) system. Repairs were completed and the system tested satisfactorily. All three units had been returned to service by October 22.

B. Inspection Activities

During the assessment period, routine inspections were performed at the Oconee facility by the resident inspectors and the regional inspection staff. Special inspections were conducted to augment the routine inspection program as follows:

March 20-21 and August 26-29, 1986: Inspection in area of Unit One Pressure Vessel Shell-to-flange weld ISI results

May 5 - June 11, 1986: Safety System Functional Inspection; an in-depth assessment of operation readiness of emergency feedwater systems

November 3-12, 1986: Review of Environmental Radiological Monitoring Programs

January 26-20, 1987: 10 CFR Appendix R Inspection

April 2-3, 27 - May 1, 1987: Low Pressure Service Water System, Low Pressure Injection Coolers and Reactor Building Cooling Unit fouling

C. Investigation and Allegation Review

No major investigative activities occurred during this assessment period.

D. Escalated Enforcement Actions

1. Civil Penalties

- Safety System Functional Inspection (SSFI) Findings
  - Design Control
  Severity Level III, two Severity Level IV's, $25,000 civil penalty issued 03-12-87

  Evaluation of partial denial and request for withdrawal of civil penalty still pending.

- High Pressure Injection system and Reactor Building Cooling units inoperable
  Severity Level III, $25,000 civil penalty issued 07-17-87

2. No Civil Penalties Issued

Appendix R, Severity Level III, no civil penalty, issued 05-05-87. Evaluation of request for reduction in severity level still pending.

3. Orders Issued

April 10, 1987	Fouling of low pressure injection and reactor building cooling unit heat exchangers for all three units.
August 6, 1987	Elevated lake water temperature, Oconee 1
August 19, 1987	Elevated lake water temperature, Oconee 2

4. Enforcement Conferences

12-22-86	SSFI Findings - Design Control
12-22-86	ECCW Surveillance During Blackout
03-06-87	Appendix R
05-13-87	High Pressure Injection Suction Valves
06-01-87	Improper Disposal of Safeguards Information

E. Licensee Conferences Held During Appraisal Period

No special NRC/Oconee management conferences were held.

F. Confirmation of Action Letters

NONE

G. Licensee Event Report Analysis

During the evaluation period 33 LER's for Units 1, 2 and 3 were analyzed. The distribution of the events by cause, as determined by the NRC staff, was as follows:

Cause	Unit 1	Unit 2	Unit 3	Total
Component	1	4	2	7
Design	6	-	-	6
Construction, fabrication or installation	2	1	2	5
Personnel:				
- Operating activity	2	1	3	6
- Maintenance activity	1	-	1	2
- Test/Calibration activity	1	-	-	1
- Other	2	-	1	3
Out of calibration	-	-	-	0
Other	1	2	-	3
Total	16	8	9	33

H. Licensing Activities

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

- Multielement spent fuel cask
- Approval to use low-level radwaste incinerator and gaseous effluent TS
- NUREG-0737, III.D.3.4 Control Room Habitability
- Incident: loss of siphon on ECCW
- Disposal of slightly contaminated wood
- Exemption and TS for Appendix J (mass-plot method)

- ICC final design

- 171 Licensing actions completed

Significant License Amendments

Oconee 1, Cycle 10 Reload
Shunt Trip, Item 4.3 of SALEM ATWS GL 83-28
Oconee 2, Cycle 9 Reload
Extension of Operating Licenses
Oconee 3, Cycle 10 Reload and administrative revisions to TS
Reactor Building Purge
RCS Subcooling Margin Monitor
39 License Amendments Completed

There were no discretionary enforcement actions requested for Oconee.

Meetings were held regularly with the licensee staff to discuss 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:

June 5, 1986	Commissioner Bernthal visit to Oconee site
June 10-11, 1986	Exit interview of SSFI on Emergency FW system
July 16, 1986	Status of licensing actions
July 17, 1986	Oconee 2 Cycle 10 TS deletion
October 13, 1986	Loss of ultimate heat sink
December 9-12, 1986	Proc. Generation Package Audit, Rebadging, 50.59 review
January 26-30, 1987	Appendix R
February 12, 1987	Appendix J
February 18, 1987	Elevated Radionclides in fish
February 18, 1987	Status of licensing actions
July 20-22, 1987	Oconee visit for elevated lake temperature, 50.59 review, PASS, and chemical cleaning of SG
July 20, 1987	Status of licensing actions

I. Enforcement Activity

1. Violation/Deviations vs. Functional Areas

FACILITY SUMMARY

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

*Licensee has outstanding request for reduction is severity level
**Denied by licensee not resolved at the end of the evaluation period

J. Reactor Trips

Eight unplanned trips and fourteen shutdowns for maintenance occurred during the evaluation period. Also during this period, Unit 1 began the period shutdown for refueling and Units 2 and 3 were each shut down once for end of cycle refueling. The unplanned trips are listed below.

1. Unit 1

May 10, 1986 - During power ascension following a shutdown for maintenance, Unit 1 tripped from 48% power due to loss of the only main feedwater pump in operation, resulting in a reactor anticipatory trip. A check valve failed in a heater drain line, causing a condensate pump to trip on low suction pressure, resulting in loss of the feedwater pump due to low suction pressure.

2. Unit 2

July 8, 1986 - Unit 2 tripped from 100% power due to failure of a feedwater flow transmitter which provides input to the Integrated Control System (ICS). The false feedwater flow signal caused a turbine trip, resulting in an anticipatory reactor trip.

July 23, 1986 - Unit 2 tripped from 100% power due to failure of a reactor coolant flow transmitter. Failure of the transmitter input to the ICS caused a transient which resulted in a turbine trip followed by an anitcipatory reactor trip.

October 23, 1986 - Unit 2 tripped from 92% following a turbine trip on high steam generator level. The initiating cause was failure of an ICS module which controls steam header pressure. Already high steam generator level precluded avoidance of a trip by operator manual control.

January 18, 1987 - Unit 2 tripped from 19% power due to operator failure to reset contact buffers for the turbine to reactor anticipatory trip following a turbine trip during startup.

March 26, 1987 - Unit 2 tripped from 96% power on high RCS pressure due to an electrical failure in the ICS BTU limit circuitry,causing a feedwater swing.

April 20, 1987 - Unit 2 tripped from 86% power on a high steam generator level which tripped feedwater pumps and the turbine causing a reactor anticipatory trip. The problem was caused by a failed multiplier module in the BTU circuitry.

3. Unit 3

September 19, 1986 - Unit 3 was manually tripped from 100% power following failure of a reheater drain line.

K. Effluent Summary for Oconee

	1984	1985	1986
Gaseous Effluents (Curies)			
Fission and Activation gases	2.33 E+4 (1.06 E+4)	2.35 E+4 (9.37 E+3)	2.43E+4 (8.04 E+3)
Iodine and Particulates	2.29 E-1 (9.56 E-2)	6.14 E-3 (9.62 E-2)	5.41 E-2 (4.60 E-2)
Liquid Effluents (Curies)			
Fission and Activation Products	1.58 E+0 (3.27 E+0)	4.20 E+0 (2.59 E+0)	5.85 E+0 (2.11 E+0)
Tritium	1.28 E+3 (7.23 E+2)	1.24 E+3 (7.35 E+2)	1.34 E+3 (7.42 E+2)

Values in parentheses are Region II averages for PWRs

Dose Offsite (mrem)

	1984	1985	1986
Liquid			
Total Body	1.74E-1	1.76E-1	2.80E-1
Maximum Organ	2.26E-1 (Liver)	8.76E-1 (Lung)	3.58E-1 (Liver)
Gas			
Total Body	3.96E+0	1.47E+0	7.58E-1
Maximum Organ	8.94E+0 (Skin)	3.92E+0 (Skin)	2.00E+0 (Skin)