ENCLOSURE

SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-261/87-22

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON UNIT 2

NOVEMBER 1, 1985 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 28, 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 H. B. Robinson Unit 2 for the period November 1, 1985, through June 30, 1987.

B. SALP Board for H. B. Robinson Unit 2

Board Chairman

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

Board Members

A. F. Gibson, Director, 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
H. E. P. Krug, Senior Resident Inspector, H. B. Robinson, DRP, RII
K. T. Eccleston, Project Manager (Robinson), Project Directorate II-1, Division of Reactor Projects, NRR

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
R. M. Latta, Resident Inspector, H. B. Robinson, 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 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 assessment period, the licensee has continued to maintain and improve on safe plant operations. Major strengths were identified in the areas of surveillance, security and outages. Major weaknesses were identified in the area of engineering support.

During this SALP period, Robinson achieved two of the longest uninterrupted runs at power since the unit was built - 93 days during cycle 10 and 102 days during cycle 11. Also the Manager of the Robinson Nuclear Project Department (Site Manager) was elevated to Vice President of the Robinson Nuclear Project and continues to be stationed on-site. This change raises the senior executive position on-site at Robinson to the same level as the other two CP&L sites. A number of other on-site management changes have also occurred to further strengthen performance and to provide cross training of key personnel.

Through almost all of the assessment period, Robinson operated with no significant problems except that the unit continued to sustain an apparent higher than normal reactor trip rate. But late in the period, a Safety System Functional Inspection (SSFI) identified several significant problems with Appendix R safe shutdown procedures and training. Also, two successive valve misposition events resulted in isolation of the low pressure and the high pressure safety injection systems. Both of these problem areas resulted in an enforcement conference. The Appendix R issue is under consideration for escalated enforcement action. A Severity Level III violation with a $50,000 civil penalty was issued, subsequent to the end of the SALP period, for the valve misposition issue.

Robinson continues to operate significantly above the national average for occupational exposure, but continues to improve its exposure profile. Although staffing and radiological control facilities have improved, there is concern about excessive accumulated exposures. The radiological hazard review of the Independent Spent Fuel Storage Installation design and construction was very good. In the area of radwaste transportation, one Severity Level III violation was issued. Corrective action to this violation was thorough. The technical capabilities of the health physics staff continued to be recognized as a strength.

Several management programs have been developed to aid the plant in performing corrective and preventative maintenance. Maintenance activities in most cases were properly conducted, with exceptions identified during the SSFI.

Several emergency preparedness weaknesses and a partial remedial drill demonstrated the need for increased management attention in 1986. Significant improvement was noted during 1987 inspections and a table top exercise.

A major security system upgrade was conducted very effectively during this SALP period, with no major problems. Licensing actions were overall satisfactory but could use some improvement, such as in the area of No Significant Hazards evaluations and in the documentation quality of Licensee Event Reports.

Overall engineering and design support was weak. Design inadequacies were noted in the electrical distribution system, including the AC, DC and emergency diesel generator systems. Also a significant equipment qualification (EQ) problem was identified late in the SALP period, based on a major NRC EQ team inspection. Escalated enforcement action is under consideration for this EQ problem.

B. Facility Performance Summary

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

Functional Area	May 1, 1984-October 31, 1985	November 1, 1985-June 30, 1987	Salp Period Ending Trend
A. Plant Operations	2	2	
B. Radiological Controls	2	2	
C. Maintenance	2	2	
D. Surveillance	2	1	
E. Fire Protection	2	2	
F. Emergency Preparedness	1	2	
G. Security	1	1	
H. Outages	1	1	
I. Quality Programs and Administrative Controls Affecting Quality	2	2	
J. Licensing Activities	2	2	
K. Training	2	2	
L. Engineering Support	NOT RATED	3	

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

During the assessment period, inspections of plant operations were performed by the resident and regional inspection staffs.

Management involvement with plant operations continued at a high level during this period. The previously reported plant reorganization, relieving the Plant General Manager of direct responsibility for support activities, such as Security, and the Planning and Scheduling organizations, has been in place approximately three years. Also, during this evaluation period, the site manager has been elevated with the title of Vice President - Robinson Nuclear Project, putting him on the same level with the senior executives at the licensee's other two sites. Approximately ten key personnel changes have also been promulgated by the licensee as part of a continuing effort to strengthen the plant organization. These changes appear to be a significant factor in improved plant performance from a safety perspective.

The responses of the licensed operators to plant transients were generally satisfactory; however, in responding to one transient, which occurred on August 25, 1986, involving the loss of both heater drain pumps, licensee personnel left the emergency boration valve open too long, resulting in a trip. The root cause of the trip was inadequate attention to detail, as the licensee procedure called for the use of control rods and not soluble boron. The licensee's corrective actions also included licensed operator reorientation concerning the appropriate uses of emergency boration. The training department also incorporated the trip into its training and retraining syllabus regarding emergency boration, and appropriate actions following the loss of the heater drain pumps. Another trip was caused by a failure to follow a surveillance procedure on September 10, 1986, whereby the control operator incorrectly informed the technicians performing the surveillance that he had removed control from the channel being tested. The licensee took appropriate corrective actions, including modification of the procedure to eliminate confusion by improving the human factors features of the procedure. This trip, as well as the over-boration trip, were reviewed by the licensee's Trip Reduction and Assessment Program (TRAP) group, which concluded that the trips were caused by personnel errors; but, that human factors problems with the procedures, especially in the case of the September 10, 1987 trip, were contributors. As a result, the

surveillance procedure, in use on September 10, 1986, was extensively modified.

During June 1987, two separate instances of mispositioned valves were identified and reported by the licensee. These events resulted in the isolation of the low pressure injection system on one day and the isolation of two of the three safety injection flow paths of the high pressure injection system one week later. An enforcement conference was conducted to discuss these issues and, subsequent to the end of the assessment period, a Severity Level III violation was issued, with a $50,000 civil penalty. The licensee took significant corrective actions which included requiring that licensed operators perform the independent verification of valve positions for valves requiring independent verification. All licensed and unlicensed operators were reoriented as to the need for complete attention when executing the positioning and verification of safety related valves.

Evidence that the licensee's trip reduction actions have had some effect in controlling reactor trips is provided by the fact that the licensee had only one reactor trip during the 6 1/2 month period ending in March 28, 1987. Also, during this assessment period, the licensee accomplished the two longest uninterrupted runs at power, for Unit 2, since the plant was built - 93 days and 102 days. Nevertheless, while a reduction in the trip rate over the previous assessment period was achieved, the trip rate remains high.

Specifically, during this assessement period, Unit 2 maintained an average availability factor of 77.15%, excluding the outage. Unit 2 was critical for approximately 10,978 hours during the reporting period. The number of unplanned, automatic trips per 1000 critical hours over the period of November 1, 1985 through June 30, 1987 was 0.91. The national average was 0.73 for Westinghouse PWRs over the period of January 1, 1986 through June 30, 1987. During the period the forced outage rate for Unit 2 was approximately 5.49 percent compared to a previous cummulative forced outage rate at the start of the period of 12.16 percent. However, during the period, the Unit 2 availability factor remained high and the unit forced outage rate was reduced.

A synopsis of the plant trips is provided in Section V.I. Of the fifteen reactor trips identified, four involved operations personnel directly or indirectly, four involved non-licensed personnel, and seven were attributable to equipment failures.

The eight reactor trips associated with personnel error do not indicate a programmatic weakness and the corrective actions

taken by the licensee indicate increased management attention to plant operations.

The four trips that involve licensed operational personnel are unrelated instances of either failure to follow procedures and/or inadequate procedures and include: a failure to block the safety injection actuation signal while cooling the plant down, a failure to open a turbine governor valve within 60 seconds of placing the unit on the line - resulting in a main generator reverse current trip, the overboration of the primary system; and the failure to reposition a steam flow channel selector switch during a maintenance surveillance test.

Similarly, the four trips associated with non-licensed personnel include the misaligned insertion of a poorly designed multipin connector in a nuclear instrumentation cabinet during trouble shooting, the mispositioning of bistables during the resetting of power range channel trip setpoints, a maintenance error consisting of two reversed steam generator instrumentation sensing lines, and the miswiring of a relay associated with the pressurizer pressure instrumentation circuit.

The seven trips associated with equipment failures have been addressed by the implementation of predictive and preventative maintenance programs, and the completion of the procedures enhancement/upgrade program. Five reactor trips occurred while the reactor was not critical.

The continued reduction of contaminated areas in the plant during this period allowed the operations personnel rapid access to perform their safety functions. Within the control room, housekeeping and operator attentiveness continued to be excellent, and data logs were maintained correctly. Operating events at Robinson have been reported promptly, accurately and conservatively. The licensee's 50.72 telephone reports have been reported in a timely manner and corrective action was taken promptly. However, as discussed in Section IV.J., the licensee's, written Licensee Event Reports (LER), have decreased in reporting quality in several areas.

During this assessment period, a Safety System Functional Inspection (SSFI) was conducted at the facility. This inspection identified problems in the area of fire protection. A group of licensed operators and senior operators were walked through selected dedicated shutdown procedures, which are designed to bring the plant to cold shutdown under fire and loss of all AC power conditions.

These walkthroughs indicated deficiencies in the dedicated shutdown procedures, related licensed operator training, radio communications, and emergency lighting. Although the licensee

committed to immediately upgrade the operator training and procedures, a followup inspection indicated that the corrective actions taken by operations were inadequate. Additional walkthroughs with licensed personnel indicated an inability to locate major valves and breakers associated with the dedicated shutdown procedures. These operators had not walked through the dedicated shutdown procedures and were unfamiliar with the contents and required local manual actions.

The multiple and complex local manual actions associated with dedicated shutdown require a constant level of capability and readiness to ensure performance of a safe plant shutdown in the event of fire and total loss of AC Power. Management attention and effectiveness was lacking in this area.

An enforcement conference was conducted and escalated enforcement is under consideration for the failure to provide adequate plant procedures, training, communications and emergency lighting to assure that the requirements of Appendix R are fully implemented. The licensee responded to the inspection report and, in a meeting with Region II management, took exception to the findings of failure to meet Appendix R requirements. This issue has yet to be resolved.

One violation was identified:

Severity Level IV violation for failure to follow procedures leading to two reactor trips. (261/86-28-05)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

B. Radiological Controls

1. Analysis

During the assessment period, inspections were performed by the resident and regional inspection staffs in the areas of worker dose control, gaseous and liquid effluent treatment and monitoring, and water chemistry, including a confirmatory measurements inspection using the Region II Mobile Laboratory.

During the assessment period, the licensee continued to improve the radiation protection program. Resolution of technical issues was a program strength. An example of this was the facility staff handling of the application for licensing of an Independent Spent Fuel Storage Installation (ISFSI), which included the health physics staff verifying that the ISFSI is designed and built appropriately to eliminate any radiological safety hazard.

Licensee management support of and involvement in the radiation protection program was adequate. During the assessment period the licensee constructed a new building including new change rooms in a lower background area of the facility which would help reduce person-rem exposure and facilitate personnel monitoring (frisking). The licensee also completed a new permanent Dosimetry Office which includes areas for the issuance of personnel dosimetry, respiratory fit testing, and whole-body counting for personnel.

The licensee's health physics, chemistry and radioactive waste staffing levels were adequate and compared favorably to other utilities having a facility of similar vintage. An adequate number of ANSI qualified licensee health physics and chemistry technicians were available to support routine operations. During outage operations, additional contract health physics technicians were used to supplement the permanent plant staff. The performance of the health physics staff in support of routine and outage operations was good. A low turnover rate in the staff resulted in a more experienced group of individuals. The high overall quality and experience level of the health physics staff was a program strength.

During the assessment period, there was a reorganization in which the licensee's Chemistry and Environmental organization was divided into two groups. The former subgroup which provided technical support activities was redesignated as Control of Effluents and Technical Assistance, and took over responsibility for the counting room, releases, environmental and radiation control technical assistance, reports, projects, and process

monitors. This group was in the process of taking over responsibility for calibration of the effluent monitors. The clear assignment of the responsibilities to each group should prove to be a strength to the Nuclear Chemistry program.

The licensee's health physics technician and general employee radiation protection training programs were adequate. The technician training program was accredited by the Institute for Nuclear Power Operations (INPO) during the assessment period.

During the assessment period the licensee was issued a Severity Level III violation on June 18, 1986, for three transportation events. The first event involved a hole found in a radioactive waste package at the disposal site and the leakage of some of the nonradioactive contents from the package. The second event involved failure to determine the correct 10 CFR Part 61 waste classification for several packages that had been shipped to a waste disposal site. The classification problem occurred due to errors by the technician who performed the classification. The third event involved shipment of a radioactive sample to an offsite laboratory for isotopic analysis. The activity of the sample was found to exceed the laboratory's license possession limits. This event occurred due to the licensee's failure to review the laboratory's license prior to the shipment. Problems were also identified in the licensee's analytical techniques for the sample. The licensee's corrective action for these events were thorough. Personnel from the licensee's corporate office were assigned to the site for several months to perform an indepth evaluation of the shipping program and to review the preparations for each shipment independently before it was released. The licensee was effective in significantly upgrading their transportation program and no similar problems were noted during the remainder of the assessment period.

The radiological effluent program was conducted in an acceptable manner. Effluent releases for the past three years are summarized in the Supporting Data and Summaries Section V.J. The plant was shutdown in 1984 for steam generator replacement, resulting in lower tritium releases. During 1985, the plant operated with some leaking fuel that was replaced in the 1986 refueling outage. This fuel replacement should result in reduced releases. The calculated offsite doses for 1986 from radioactive effluents were 2.35E-01 person-rem to the whole body and 3.45E-1 person-rem to the thyroid. These values place the licensee well below the limit of 40 CFR 190.10, which is 25 person-rem to the whole body over any 12 consecutive months.

Plant chemistry control continued to benefit from the major modifications that had been made on the major components of the steam and power conversion system in 1984. Because of the current design of these components and the efficiency with which

the condensate cleanup system was operated, the chemistry control of water in the secondary system was significantly better than the criteria developed by the Steam Generator Owners Group. Improvements to these components were continuing to be made. Likewise, the elements of the licensee's chemistry control program continued to be improved, especially in staffing, training, and implementation of procedures based on guidelines recommended by the Steam Generator Owners Group.

Management attention to keeping exposures as low as reasonably achievable (ALARA) was increased; however, the total accumulated exposure for the facility was still well above the PWR national average. The licensee's collective occupational dose for calendar year 1986 was 539 person-rem compared to a goal of 450 units person-rem and a PWR national average of 397 person-rem. The major reasons given for exceeding the 1986 goal were underestimation of scheduled outage exposure by 58 person-rem and a forced outage in August to repair leaking hand hole covers on the steam generator, which accounted for approximately 32 person-rem. During 1986, the licensee had 48 days of scheduled outage with an average of 8.5 person-rem per day. Also during the same period the licensee had 9 days of unscheduled outage with an average of 3.4 person-rem per day. Through June 1987, the total collective dose was 436 person-rem; the goal for 1987 was set at 450 person-rem. Based on the projected workload through the end of the year, the licensee will likely exceed the 1987 goal as well as the PWR national average. Completion of unplanned reactor head repair work during the recent refueling outage, and environmental qualification of electrical splices in containment in accordance with Regulatory Guide 1.97, which accounted for approximately 117 person-rem, were prime contributors in exceeding the 1987 goal. During 1987, the licensee had 87 outage days with an average of 8.0 person-rem per day.

In December 1986, (2.98% of the RCA), 2374 square feet of the radiation control area (RCA) of the plant were maintained as contaminated (excluding containment). The contaminated square footage increased due to an outage in early 1987; but, as of June 1987, the area under contamination control had been reduced to 1836 square feet (2.31% of the RCA).

During calendar year 1986, the licensee disposed of 16,000 cubic feet of solid radioactive waste containing 158 curies of activity. This was more than double the PWR national average of 7,450 cubic feet per unit. The large total was due to the licensee's concentrated efforts to dispose of accumulated waste from the 1984 steam generator outage and cleanup of the spent fuel pool. Also, more than 50% of the total was made up of solidified evaporator bottoms which will not be a contributor in the future because the licensee has installed demineralizers in

place of evaporators. Through June 1987, the licensee had disposed of 1955 cubic feet of solid radioactive waste containing 101 curies of activity. The goal for 1987 was set at 10,000 cubic feet.

Three violations were identified:

a. Severity Level III violation for 1) failure to properly classify radioactive waste transferred to a land disposal facility, 2) failure to comply with DOT specifications for strong tight packages and 3) failure to comply with license activity possession limits when transferring radioactive material to another licensee (261/86-09-01).

b. Severity Level IV violation for failure to post and barricade a high radiation area in excess of 100 person-rem/hr (261/86-09-02).

c. Severity Level IV violation for failure to establish adequate radiation protection procedures concerning respiratory protection and contamination control surveys for release of materials to uncontrolled areas (261/86-20-01).

2. Conclusion

Category: 2

3. Board Recommendations

Licensee performance in the area of Radiological Controls continues to be Category 2 as rated during the previous SALP period. The Board recognizes the licensee's commitment in staffing and providing facilities in this functional area. Although these commitments have resulted in minimal contaminated areas, there is concern about excessive accumulated exposures. The licensee should continue increased management attention and the NRC inspection effort should be maintained at normal levels.

C. Maintenance

1. Analysis

During the assessment period, routine and special inspections were performed by the resident and regional inspection staffs.

The licensee identified the need to improve maintenance activities during the assessment period and has implemented a number of programs to increase effectiveness, as described in subsequent paragraphs. The management organization at Robinson was modified to provide separate managers for both operations and maintenance. The maintenance department has shown improvements in several areas. These included procedure upgrade, preventative maintenance, enhanced work order tracking, post maintenance acceptance testing, maintenance trending and prediction, and craft and technical development.

A procedural upgrade program of Maintenance Surveillance Tests (MST's) which were identified as contributors to plant trips was accomplished during this assessment period. These procedural improvements, which included human factors considerations, were rewritten with input from both maintenance personnel and plant operations. The modified MST's stressed the use of uniform terminology and were focused on clear interpretation of each procedural step to the maintenance and operations personnel involved in the conduct of the test. Additionally, procedural emphasis was placed on personnel responsibility by the use of dual signoff's on critical steps in the MST's.

The Preventative/Predictive Maintenance Program, as implemented through the Maintenance Management Manual, enhanced the reliability of plant production equipment by reducing equipment failures and equipment downtime due to maintenance. During the period from 1983 to the end of 1986, the ratio of preventative maintenance to total maintenance has increased while the ratio of unplanned corrective maintenance to total maintenance has decreased.

The Automated Maintenance Management System (AMMS) was implemented during this reporting period. The AMMS is a computerized form of the existing Maintenance Management System which provides an automated means of work order initiation, planning and completion documentation with added administrative capabilities. This system provides for the prioritization of maintenance backlogs with emphasis on items concerning safety related equipment and limiting conditions for operation. The system also provides for scheduling aids to assist in corrective maintenance, preventative maintenance, periodic testing and planned and forced outages.

Vibration measurement of rotating equipment was used to monitor and identify possible degrading trends in equipment, as compared to Inservice Inspection (ISI) "alert" and "action" levels.

The interface between maintenance and groups responsible for modifications constrains maintenance to certify that it has reviewed modifications for acceptance testing, procedure changes, spare parts, and maintainability. Selected maintenance personnel have received extensive advanced training on the Emergency Response Facility Information System (ERFIS) and the Security Modification Package. Additionally, there is a craft and technical development program which insures competency requirements and develops potential and career enhancement within the maintenance department.

Completion of the procedural upgrade program, along with continual training of maintenance personnel on procedural compliance, received continued emphasis from licensee management. It was noted that appropriate management attention was provided to ensure that supervisory maintenance personnel conducted frequent on-the-job observations of maintenance activities. The maintenance staff demonstrated good morale, and an adequate level of technical expertise, but relied heavily on "skill of the trade". Communication between the maintenance staff and operations staff with respect to prioritization and control of safety-related maintenance remained good. Improvement was observed in maintenance of equipment that directly supports safety-related systems; as was reflected in a high capacity factor coupled with reductions in the reactor trip and forced outage rates.

In most cases, safety-related maintenance activities were conducted properly. However, an SSFI inspection which included the observation of maintenance activities and the maintenance history associated with the emergency diesel generators (EDG) indicated the need for continued management attention to maintenance activities. For example, information distributed by the EDG vendor and INPO addressed previous failures of similar diesels at other sites due to scavenging air blower failures. The licensee was not been sensitive to this information. They continued to run their diesels in excess of the recommended times unloaded, did not perform blower clearance measurements during the previous outage, and did not initiate corrective actions when signs of rubbing were noted following an extended 2 hour unloaded run of the "B" EDG during a plant event. These deficiencies may have contributed to a subsequent failure of the "B" EDG blower. This series of events indicated ineffective implementation of the maintenance program.

A self evaluation of the maintenance area was performed in accordance with INPO Guideline 85-038. This effort resulted in a multidisciplined interorganizational project which produced a

compilation of 79 recommendations to further improve maintenance activities. Eighteen of these recommendations have been acted upon including the implementation of AMMS, the addition of a maintenance procurement coordinator, the development of a forced outage worklist, implementation of uniform guidelines for QA receipt inspection, and enhanced maintenance scheduling and tracking capabilities.

The licensee developed a long term surveillance program for the detection of further deterioration in the safety-related service water system caused by microbiologically induced corrosion. During the 1987 refueling outage, the licensee chemically treated the Heating Ventilation Handler (HVH) Units 1, 2, 3, and 4 and their associated service water piping with biocides to inhibit the propagation of biologically based fouling.

Additionally, Robinson developed an erosion/corrosion (E/C) program aimed at identification of secondary systems susceptible to this phenomenon and monitored and corrected active E/C components through inspection, mapping evaluation and repair/replacement. During this reporting period, E/C inspections have been performed on feed water piping, turbine piping, and turbine crossover tees. As a result of these inspections, repairs and replacements have been accomplished during the 1987 refueling outage on portions of the heater drain and vent systems. However, no feedwater piping required replacement.

Quality Assurance/Quality Control (QA/QC) personnel in the maintenance area were well qualified and knowledgeable of procedure requirements. Records were generally complete, well maintained, and available. A program has been implemented by document control to evaluate information on safety-related equipment and procedurally incorporate vendor recommendations into non-Westinghouse Technical Manuals. The implementation of the vendor manual upgrade program was completed.

One violation was identified:

> Severity Level V violation for failure to adequately document and implement steam generator water level protection channel testing procedure, which resulted in a plant trip. (261/86-07-01)

2. <u>Conclusion</u>

Category: 2

3. <u>Board Recommendations</u>

NONE

D. Surveillance

1. Analysis

During this assessment period, inspections of surveillance activities were performed by the regional and resident inspection staffs.

Inspections were performed in the areas of type A containment testing, snubber surveillance program, ISI program, and the reactor systems surveillance program, all of which showed evidence of appropriate prior planning.

Inspection of activities related to startup testing and surveillance were conducted following the return to service of equipment that was repaired or modified during the refueling outages. Based upon the surveillance procedures reviewed, those tests which were witnessed, and the examination of selected test results, licensee procedures were technically adequate, properly followed, and satisfactorily completed.

The licensee's surveillance program was well established, implemented, and effective, in that scheduling and completion of surveillances were timely and received adequate management attention. Additional control for surveillance tracking and auditing was established and implemented to ensure complete compliance with requirements including a review and revision of the plant program procedure which cross references surveillances to Technical Specifications requirements. Review of procedures, surveillances and corrective actions as well as personnel interviews indicated adequate program implementation.

Management commitment to quality was affirmed by regional assessment of procedures and administrative controls used during containment integrated leak rate testing. The licensee's staff demonstrated technical understanding, responsiveness to NRC concerns and the ability to plan, coordinate and control the numerous details associated with complex tests and surveillances.

Licensee performance was effective, in that surveillances were performed on schedule, and records were found to be generally complete, well maintained and available.

Effective management involvement was demonstrated in this area as evidenced by the identification of no violations, the commitment to an enhanced surveillance program through procedure upgrade, the implementation of a computerized data base for the ISI program, and additional controls for surveillance tracking and auditing.

No violations or deviations were identified.

2. Conclusion

Category: 1

3. Board Recommendations

NONE

E. Fire Protection

1. Analysis

During this assessment period routine inspections were conducted by the region staff in the areas of the licensee's implementation of the fire protection program and followup on previously identified fire protection and associated circuit issues from a team inspection made in February 1985. This inspection confirmed that the plant Appendix R safe shutdown methodology was consistent with the NRC Safety Evaluation Report. The inspections during this period indicated that the licensee's corrective actions on nine of the previously identified fire protection and associated circuit issues were adequately addressed; however, during an NRC SSFI conducted from March 9 to April 19, 1987, problems were noted with respect to the plant implementation of procedures, operator training and emergency communications/lighting for safe shutdown in the event of fire. The SSFI indicated that the licensee had not devoted adequate attention to the implementation of the requirements of 10 CFR 50 Appendix R. Several weaknesses were noted in the emergency lighting of dedicated/alternative shutdown plant areas and equipment. In addition, radio-to-radio communications was inadequate to provide communications essential for coordination of dedicated shutdown procedural evaluations.

The staff inspections also reviewed the licensee's implementation of the fire protection program and administrative controls. 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 training of the plant fire brigade. These procedures were reviewed and found to meet the NRC's requirements and guidelines. Housekeeping and control of combustible and flammable materials were satisfactory. The fire protection-extinguishing and detection systems were found to be in service. Organization and staffing of the plant fire brigade met procedures and the NRC's guidelines.

The licensee's annual fire prevention/protection QA audit was reviewed. This audit was conducted within the specified frequency and covered the essential elements of the fire protection program. The licensee had implemented corrective action on discrepancies identified by the audits.

In general, the management involvement and control in assuring quality in the fire protection program was adequate due to the issuance and implementation of fire protection administrative procedures that met the minimum NRC requirements and guidelines. The licensee's approach to resolution of technical fire

protection issues indicates an apparent understanding of issues, and is generally sound and timely. Response to NRC initiatives was generally timely.

No violations or deviations were identified.

2. Conclusion

Category: 2

3. Board Recommendations

NONE

F. Emergency Preparedness

1. Analysis

During the assessment period, inspections were performed by the regional and resident inspection staffs. These included two routine emergency preparedness inspections and the observation of both a partial participation exercise and a drill conducted to demonstrate early corrective actions taken in response to exercise weaknesses identified during the partial participation exercise.

The partial participation emergency exercise conducted December 17, 1986, identified four exercise weaknesses. The weaknesses addressed an inadequate medical drill, (42 minutes required for first aid team to respond), excessive time required for TSC and EOF activation (80 minutes and 90 minutes, respectively), and failure to provide complete and timely information to the State and counties (e.g. indicating a release was ongoing which had terminated some 25 minutes earlier and providing only one follow-up message during a 2 hr. 45min. period when a General Emergency Classification existed). The fourth exercise weakness was caused by numerous message inconsistencies that necessitated last minute changes to the exercise scenario. An inadequate review of these changes to the exercise scenario and messages by the controller led to questioning of the adequacy of the messages and contributed to the excessive controller prompting of control room players. As a result of the above findings, the licensee committed to conduct a licensee-only medical drill and a limited table top exercise to demonstrate timely corrective actions. The licensee conducted this drill/table top exercise on February 18, 1987. This drill demonstrated that adequate corrective actions had been taken.

The routine inspections determined that the licensee maintained a capability for notifying and communicating with required agencies and authorities during an emergency (and demonstrated the performance of this capability during the table top exercise), maintained an adequate emergency response training program with one exception listed below, disseminated planning information to the public on an annual basis, and conducted an independent review of its emergency preparedness program. The one exception to the adequate training program was a violation for failure to provide initial training and annual retraining for various members of the emergency organization in accordance with the Emergency Plan and implementing procedures.

In 1986, the licensee's emergency preparedness program demonstrated a need for increased management attention as shown

by the four exercise weaknesses resulting in a partial remedial drill and a limited table top exercise and one violation identified during the routine inspection program. The results of both the table top exercise and route inspection conducted in 1987, indicated significant improvements in the program, indicative of improving management oversight.

One violation was identified:

> Severity Level IV violation for failure to provide initial training and annual retraining for various members of the emergency organization in accordance with the Emergency Plan and implementing procedures. (261/86-21-03)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

G. Security

1. Analysis

During the evaluation period routine inspections of security and safeguards activities were performed by regional and resident inspectors. One special inspection was conducted during this period.

The staffing level of the licensee's security management function and of the contract security force were adequate to fully implement and maintain required security measures. Licensee security management had increased their awareness of, and involvement in, the activities of the security force and showed an innovative approach to solving security problems.

The licensee's ability to effectively plan and implement a security program and resolve security issues was demonstrated by the execution of a major improvement program which included a new access control building, security computer, central alarm station, security system power supply, Protected Area lighting, installation of x-ray search equipment, and badge control measures. The licensee experienced some initial problems with the new computer system, which were promptly addressed and resolved.

The operational capability of the contract security force benefited from an effective training program, quality assurance efforts, and strong managerial support at both plant and corporate levels.

The licensee's corporate office continued to conduct a very aggressive and effective program to audit contractor personnel screening programs.

One violation was identified during the evaluation period and was not indicative of a programmatic weakness. The licensee was fully responsive and promptly initiated adequate corrective actions. Licensee response to NRC Information Notices and other concerns was adequate.

One violation was identified:

Severity Level IV violation for failure to properly store Safeguards Information (261/86-24-01).

2. Conclusion

Category: 1

3. Board Recommendations

NONE

H. Outages

1. Analysis

During the assessment period, both regional and resident inspectors observed activities associated with two refueling outages. The first was a 7-week outage which started in February of 1986 and the second was a 11-week outage which started at the end of March 1987. Both of these outages involved ambitious schedules. The outage management organizations employed extensive preplanning and a proactive approach. The scheduled startup date from the 1987 outage was delayed approximately three weeks due to an increase in the scope of work resulting from the SSFI and EQ inspections performed just prior to and during the outage. Major work items accomplished during the 1987 outage included replacement of the low pressure turbine rotors, refurbishment of the circulating water intake bays, and non-destructive examination of the steam generator heat exchanger tubes.

Fuel handling activities were observed and found to be in compliance with applicable Technical Specifications and regulations. The licensee's resolution of technical problems were excellent. The support and liason provided by the onsite reactor engineering staff and the corporate fuels personnel properly supported the outage program. The licensee's extensive preparations for both the 1986 and the 1987 outages resulted in reduced exposures to workers than would have been the case without such planning; however, the 1986 goal was exceeded due to an underestimate of the scheduled outage exposure, coupled with a forced outage in August 1986, while the 1987 goal is expected to be exceeded because of the completion of unplanned repair work for primary system leakage located just above the reactor head.

The licensee employed a team concept in outage management that was implemented during the previous assessement period. The use of the enhanced outage organization allowed the licensee to track ongoing and projected work activities expeditiously, while ensuring the completion of required documentation.

The enhanced outage management concept, which emphasized planning, communication and teamwork, was used to prepare for the 1986 and 1987 outages. Significant strengths of this concept were:

Issuance of a detailed outage manual providing guidance and identification of previously successful concepts.

Clear identification and assignment of responsibility for outage goals.

Identification of an outage management group 9 months prior to the start date and the assignment of a dedicated outage work group three months prior to the outage start data.

Planning for the 1987 outage started immediately after the 1986 outage, with the development of a single integrated outage schedule with an identified cut off date for all work groups.

The "system window planning concept", which defines the available time allowed for work before impacting the critical path item, was successfully employed for both outages.

A forced outage work list of planned work activities, including prestaged parts and completed engineering requirements, was actively maintained.

Inspectors reviewed the ISI/IST Program, procedures and records, and observed inservice inspection in progress and determined that these activities were performed in accordance with the requirements of ASME Section XI as well as applicable codes and standards. Adherence to ISI procedures was satisfactory with only a modest number of personnel errors. The one violation was an example of personnel error. The staff found that reviews were generally thorough and technically sound and responsiveness to NRC initiatives was usually timely. The ISI/IST corrective action system promptly and consistently recognized and addressed non-reportable concerns. Records were complete, well maintained and available.

One violation was identified.

Severity Level IV violation for failure to use an appropriate calibration block for ultrasonic inservice examination of reactor plant piping. (261/87-07-01)

2. Conclusion

Category: 1

3. Board Recommendations

NONE

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 purposes of this assessment, this area is defined as the ability of the licensee to identify and correct their own problems. As such, it encompasses all plant activities all plant personnel, as well as those corporate functions and personnel that provide services to the plant. The plant and corporate QA staff are part of the entity, and as such, they have responsibility for verifying quality. The evaluation of this area specifically included results for various groups in achieving quality as well as the QA staff in verifying that quality was achieved.

The programmatic controls for QA/QC activities were adequate. The onsite QA surveillance groups were well staffed with knowledgeable and experienced personnel who were well directed.

Corporate and Plant management involvement in more effective and efficient use of Quality Assurance (QA) organization resources was evident during the period. Beginning in the last SALP period and continuing into the present period, QA management sought better ways to utilize QA resources. There was a noticeable shift in QA policy and philosophy which resulted in an increased emphasis on surveillance type activities versus paper reviews. For example, the licensee implemented a sampling program versus a 100% review of completed documentation. Management reviews of the impact of the change during this assessment period revealed a potential for additional refinement which should free additional resources for surveillance type activities. The review identified areas in which few or no significant findings have been issued. QA management, in conjunction with maintenance management, was working with a revised sampling program acceptance criteria which resulted in less efforts in these areas by both QA and the plant staffs.

Increased surveillance type activities were exemplified by the implementation of a Quality Verification Program. This was an in-depth inspection by the licensee of all attributes associated with one construction/modification or maintenance activity. The inspection continued until an acceptable level of performance was obtained. Completion of one inspection resulted in increased proficiency in qualified equipment electrical splices.

Positive responsiveness to NRC initiatives were demonstrated by QA management. A joint effort by QA and the plant staff was

undertaken to reduce the number of NCRs which have been outstanding for long periods. The oldest NCR that remained open at the end of this assessment period was opened on August 1, 1986. Also, to give NCRs higher visibility, all NCRs are now issued to section managers rather than to foremen or supervisors.

The SSFI indicated, however, that an expanded use of the NCR program, to cover such areas as the failed DG temperature test and the DG lube oil water contamination in excess of procedural limits, could further improve the QA program. Expanded use of the NCR could help ensure appropriate levels of management and technical review, adequate and timely corrective actions, and documentation of related evaluations.

Management also demonstrated positive responses to issues in the industry. Based upon the NRC's Safety System Functional Inspection (SSFI) program at another facility in Region II, Robinson site management initiated an SSFI of the auxiliary feedwater system, starting in September 1986, which is scheduled to be completed in September 1987. A team approach was used. In addition to QA personnel, members from other onsite and corporate organizations were included.

The Quality Check Program, transplanted from Harris to Robinson in early 1987, provided the employees with the opportunity to express concerns and receive answers on any issue related to plant operation.

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:

The manager of the Robinson Nuclear Project Department was elevated to Vice President of Robinson Nuclear Project and continued on site.

Several management programs have been developed to aid the plant staff in performing corrective and preventive maintenance.

Management involvement with plant operations continued at a high level as evidenced by increased attention in the area of corrective actions.

Increased management attention in the area of preventative/predictive maintenance has contributed to a reduction in the forced outage rate.

Management commitment to quality was affirmed by regional assessment of procedures and administrative controls used during containment integrated leak rate testing.

Licensee security management increased their awareness of, and involvement in, the activities of the security force and showed an innovative approach to solving security problems.

Outage management organizations employed extensive preplanning and a proactive approach.

The use of the team concept in outage management has allowed the licensee to track ongoing and projected work activities expeditiously, while ensuring the completion of required documentation.

Identification of an outage management group 9 months prior to the start date, and the assignment of a dedicated outage work group three months prior to the outage start date has increased the effectiveness of outage planning.

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

Management needs to continue to stress the reduction of the reactor trip rate.

Increased management attention is necessary to ensure that safe shutdown capability, under 10 CFR 50, Appendix R conditions, is maintained.

Electrical system design control and engineering, needs management attention to ensure a sound basis for facility modifications.

The Equipment Qualification program needs increased management review to verify that the program has identified and qualified all applicable components.

The effectiveness of management attention to ALARA was weak in that the exposure at Robinson is still well above the national average.

Increased management attention is needed in the area of significant hazards evaluations which are submitted with each license amendment request.

No violations or deviations were identified.

2. Conclusion

Category: 2

3. Board Recommendations

NONE

J. Licensing Activities

1. Analysis

The basis for the appraisal in this area was the licensee's performance in support of licensing activities (amendment requests, responses to generic letters, and other actions) which have been reviewed and evaluated by the staff during the rating period. The subjects involved include, in part, the following: In general, management involvement has been constant over the report period. Management has requested meetings with NRR senior management (post NRR reorganization) to discuss management issues. Licensing management has generally demonstrated prior planning and involvement in both site activities and licensing activities. Involvement in assuring quality is apparent from the timeliness, thoroughness, and technical soundness of most reviews performed.

However, there continues to be some areas that need increased management attention. One of these areas is in the quality of the No Significant Hazards (NSH) considerations evaluations that the licensee submits with each license amendment request. The basis for concluding that NSH considerations are involved with the proposed change has only been marginally adequate for about 50% of the time. Other areas that need increased management attention are on issues that appear to be of less safety significance or less significance to direct plant operation. These items tend to remain unresolved for long periods. Examples in this category are responses to the pressurized thermal shock (PTS) rule, resolution of responses to the IST and ISI issues, and NUREG-0737, Item II.E.1.2, with regard to Automatic Bus Transfer. The NRC request for additional information regarding the licensee's ANSI N-411 relief request has not been responded to in an expeditious manner.

Generally, the licensee has been responsive to NRC initiatives. The licensee's responsiveness to the staff's requests for additional information has generally been prompt and complete, particularly for major issues. The licensee has made a concerted effort during the assessment period to meet deadlines and to attain timely resolutions of major technical issues. The licensee kept the Project Manager informed on status of ongoing activities and has taken the initiative in discussions and meetings on ongoing licensing activities. The licensee's efforts have significantly reduced the backlog of open action items over the report period.

The licensee generally demonstrated sound technical understanding of safety issues involving licensing actions. The licensee's approach to resolution of technical issues from a

safety standpoint generally exhibited conservatism. Demonstrations of this were evidenced by major actions such as core reloads, LOCA analysis, heat-up and cool-down curves and the resolution of PTS regarding vessel beltline weld material property. The licensee continued to keep informed of industry approaches to plant safety issues and was aware of programs, problems and resolutions thereto, at other plants. The licensee accomplished this by membership in major industry advisory groups and, particularly, by membership in owners groups. The licensee has taken the initiative in resolution of many multi-plant issues. Generally, where resolutions are made through owners groups or contractors, the submittals are thorough and complete. However, in the case of plant specific items, or where alternative solutions to generic items were proposed, the licensee has occasionally not provided thorough technical information to justify their approach, which has necessitated many requests for additional information. Typical examples of these were ISI and IST program and relief requests, automatic trip of the RCP's, reactor trip system reliability, response to the PTS rule, and automatic bus transfer device (open item from item II.E.1.2. of NUREG-0737, AFWS Automatic Initiation and Flow Indication from NUREG-0737). Staffing has generally improved as evidenced by a substantial reduction in backlog. The licensee has taken the initiative to revise staffing, which resulted in clearer lines of communications and unloading of multiple duties. This has resulted in more timely resolutions to issues and problems, and more attention to resolving issues.

Regarding reporting of operational events, the licensee was generally timely and usually complete, unless an event was reported prior to all details being known. In these cases, follow up reports are made. Licensee Event Reports (LERs) were timely and complete in general. A recent AEOD report dated July 22, 1987, however, compared LER's from November 1985 through June 1987 with the reporting requirements of 10 CFR 50.73(b) and the guidelines contained in NUREG-1022 and concluded that the reporting quality documentation in important areas, such as discussions of safety system responses and identification of failed components, has decreased since the previous assessment period.

One violation was identified during the evaluation period and is not indicative of a programmatic weakness. This violation involved an oversight in submitting a safety evaluation which resulted from a miscommunication between the onsite Regulatory Compliance group and the Corporate Nuclear Licensing staff. The corrective action taken was to formalize the subject reporting requirements and assign responsibilies to cognizant individuals.

One violation was identified:

Severity Level V violation for failure to submit a description of the 1985 facility changes, tests and experiments, and a summary of the safety evaluation of each as required by 10 CFR 50.59 (b). (261/86-26-01)

2. Conclusion

Category: 2

3. Board Recommendations

NONE

K. Training

1. Analysis

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

During this period, Unit 2 received INPO training accreditation in the following training areas: Shift Technical Advisors, Health Physics, Instrumentation and Controls, Electrical Maintenance, Mechanical Maintenance, Chemistry, and Technical Staff and Managers. This effort provided Robinson with complete INPO training accreditation. The training programs for Non-Licensed Operators, Reactor Operators and Senior Reactor Operators had been accredited during the previous assessment period.

The licensed operator requalification program was reviewed and judged to be adequate. Training was conducted in accordance with training instructions which reflected the NRC approved program.

Replacement licensed operator examinations were administered during the week of January 27, 1986, and September 30, 1986, with the following results: eight reactor operator replacement examinations were administered with seven candidates passing; nine senior reactor operator replacement examinations were administered with eight candidates passing. There were no generic weaknesses noted in the written or oral exams. These results were substantially above industry average for replacement examinations.

Simulator examinations were not administered with the replacement operator examinations. H.B. Robinson received their site specific simulator in May 1987. Acquisition of the site specific simulator will enable the licensed operators to acquire additional operational experience, including greater familiarity with Emergency Operating Procedures. Simulator replacement examinations were conducted in August 1987.

Relative to the two separate instances of valve mispositioning which occurred during June of 1987, the licensee's operating, radiological, and fire protection staff members received training on the importance of independent verification. This training was provided by the Operations Supervisor and covered the basis for acceptable practices as well as reemphasizing adherence to procedural requirements for independent verification. Additionally, the training department scheduled classroom presentations for the auxiliary operators, reactor operators, and senior reactor operators concerning the

requirements of independent verification and procedural adherence.

The training conducted reviewed the licensee's controls established for the positioning and operation of safety related valves and equipment. Emphasis was placed on the requirements to use an approved copy of valve lists, the constraint to separately verify the position provided to the independent verifier, and the requirement that the procedure be initialed by those performing the work. This training was effectively performed.

One area of major concern pertained to licensed operator training on the Dedicated Shutdown Procedures (DSPs). These procedures are utilized to satisfy the requirements of 10 CFR 50, Appendix R - Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979. The SSFI conducted during March 1987, determined that the licensee had not provided DSP requalification training to reactor operators and senior reactor operators since the initial training performed in May and June of 1985. Also, the training staff had not performed systematic evaluations of the performance and competency of licensed operators and senior reactor operators to perform the abnormal and emergency actions required to achieve safe shutdown, as required by 10 CFR 55, Appendix A. Significant training deficiencies were observed by inspectors during walkthrough of the DS procedures indicating the inability to locate major valves and breakers. The lack of adequate training and retraining was of concern considering the number, complexity, and severity of manual actions required, and the extreme conditions under which these actions would need to be accomplished.

The SSFI also indicated potential weakness in the level of general electrical training and retraining provided to licensed operators and senior operators. For example, some individuals did not understand the logic associated with the electrical trip/reset button on safety-related 480 volt circuit breakers and on the logic associated with the transfer of MCC 5 power source.

Review of maintenance training indicated that a number of individuals had worked for the licensee for several years, a positive factor for the licensee, in that the retention of qualified and experienced maintenance personnel would allow the licensee to continually have a high level of knowledge from which to draw. Current revisions to the training program indicated vast improvements over the previous on-the-job-training. The revised program includes classroom instruction on plant procedures, plant drawings, and an introduction to nuclear power. Maintenance personnel are involved in retraining which

covers new plant modifications, maintenance procedural changes, licensee event reports and administrative procedures.

No violations or deviations were identified.

2. Conclusion

Category: 2

3. Board Recommendations

NONE

L. Engineering Support

1. Analysis

During the assessment period, inspections of activities related to engineering support were performed by the resident and regional inspection staffs. Specific activities inspected were plant modifications associated with two refueling outages; the licensee's new fuel cycle designs, as well as other related activities, including work on the auxiliary feedwater system, repairs to the containment dome, and replacement of the "A" service water pump.

In recognition that additional improvements were needed to improve plant modifications, in January 1985, the licensee created the Design Engineering Section (DES) which reported directly to the Site General Manager. Staffing of the DES continued into 1986 at which time the DES consisted of seven liaison engineers reporting to the Manager of DES.

The increased management attention has resulted in a general improvement in quality and schedular control over plant modifications; however, the SSFI reviewed several areas of the licensee's overall design control and modifications program, with emphasis in the disciplines of electrical, instrumentation and control, HVAC, mechanical and structural. This review revealed several engineering support deficiencies in these areas.

Inadequate measures for controlling calculations which form the design and operating basis of the plant were noted. Due to this lack of control the licensee cannot be assured of the correct translation of the design and operating basis calculations into specifications, drawings, procedures and instructions for the plant as required. Formal design analyses were not in place to validate that the design is capable of performing its intended function and to document to engineering personnel the design bases and design conditions for the plant. This lack of analyses indicates a significant weakness in the licensee's performance of design activities.

In the electrical area several problems were noted: electrical system voltage calculations did not address specific configurations and actual field conditions, design analyses were not performed to validate the electrical system design, and electrical design had not been validated for various plant operating conditions as described in the FSAR.

The licensee identified inadequacies in the electrical distribution system of the facility under postulated LOCA

conditions. A modification to the electrical distribution system was accomplished to ensure that a reliable source of off-site power was available. However, a significant design deficiency was noted, by the NRC, in the interrupting capability of the electrical protective devices utilized in the 480 volt emergency power system. The licensee performed design analyses to establish short circuit current available to the emergency AC power system for various plant configurations, including normal operation and LOCA conditions, in excess of the emergency bus load breaker interrupting capability. The licensee submitted a Probabilistic Risk Assessment (PRA) to the NRC to justify not upgrading the switchgear interrupting capability.

Additional circuit breakers including those in the DC distribution system, were identified as being subject to fault current in excess of the rated interrupting capacity and are the subject of licensee review.

Several examples of inadequate support and improper installation of safety-related equipment were noted in the EDG fuel oil day tank, EDG air start piping, safety-related batteries and Class 1E inverters. When these inadequacies were identified to the licensee, prompt corrective action was taken to analyze the conditions and/or correct the installation.

It was also noted during the review that plant modifications contained incomplete installation instructions and drawing inaccuracies. Drawings which do not accurately reflect the true plant design, particularly on safety-related systems, can contribute to errors in operations, engineering, and maintenance, which can jeopardize the safety of the plant.

During the review of a plant modification, it was noted that the safety-related batteries were inadequately load sized. The licensee failed to review the original requirements for adequacy or review the present loading to ensure that the new batteries would have sufficient capacity to perform their safety function based upon the assumption that the FSAR battery load table (8.3.2-1) was complete. When these inadequacies were identified to the licensee, prompt corrective action was taken to analyze the condition.

The licensee recently implemented a new modification and design control procedure which delineates the required elements to be included in all modification packages. The quality, completeness, and consistency of the modification packages should improve with the implementation of this new procedure.

Overall engineering support was weak as noted above. The Nuclear Engineering Licensing Department (NELD) is being staffed up, which will strengthen its ability to support the plant's engineering needs. Robinson engineering support is provided

primarily from plant staff resources. Plant modifications that were completed in the last six month were of better quality i.e., technical, documentation, etc., than earlier ones. Design and engineering issues identified during the SSFI are under consideration for enforcement action.

The inspection effort also included a special team inspection, lead by the NRR Vendor Inspection Branch, to assess the licensee's program for environmental qualification (EQ) of electrical equipment and a subsequent inspection, conducted by the regional staff, to followup on corrective actions for EQ deficiencies identified during the initial EQ inspection. The NRC inspectors examined the licensee's program for establishing the qualification of electric equipment in accordance with 10 CFR 50.49. The EQ program was evaluated by examination of the licensee's qualification documentation files; review of procedures for controlling the licensee's EQ efforts; verification of adequacy and accuracy of the licensee's 10 CFR 50.49 equipment list; and examination of the licensee's program for maintaining the qualified status of EQ equipment. Some deficiencies were identified as described below: (1) failure to identify or to show qualification for the plant cables inside and outside containment; (2) failure to qualify connectors and shrink-fit sleeves used on parts of the containment electrical penetrations; (3) qualification deficiency in four valve operators; and (4) failure to seal cable entrances for solenoid valves and transmitters. Prior to plant restart the licensee completed corrective actions on most of the deficiencies. However, the deficiencies on the identification of EQ cable were not expected to be resolved until six months after plant startup. Prior to startup, the licensee prepared a justification for continued operation on the effected cables. Staffing for maintaining the EQ program was considered adequate. Key positions are identified, and authorities and responsibilities were well defined in procedures; although, procedures that controlled EQ activities were lacking in the areas of maintenance and control of EQ files (i.e, contractor interface). Training was performed for all personnel involved in EQ, partly in response to a nonconformance report; however, no refresher training was required. Overall, the EQ program is considered to be minimally acceptable. Escalated enforcement action is under consideration for the EQ deficiencies identified by the NRC.

No violations or deviations were identified.

2. <u>Conclusion</u>

Category: 3

3. Board Recommendations

The Board recommends further licensee management attention be given to overall engineering support and specifically to the EQ Program. NRC inspection activity should be increased in this area.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Two refueling outages occurred within the period. Both outages were effectively performed. No power limitations were in effect during this period. The licensee is in the process of increasing the average enrichment of the core in order to increase the number of effective full power days (EFPD) for which the core is capable. This goal is complicated by the fact that the Robinson core is equipped with part-length shielded assemblies used to reduce the neutron fluence to which the reactor pressure vessel is exposed. As enrichments have been increased, to provide the increased core operating time, the gadolinia burnable poison concentration has also been enriched to control both excess reactivity and power peaking. Cycle 10 achieved 319 EFPD, Cycle 11 achieved 335 EFPD and Cycle 12 is expected to achieve 351 EFPD.

Technical Specification (TS) changes were obtained by the licensee to cover the use of increased fuel uranium enrichments. Similarly, the licensee received NRC approval for the use of fuel assemblies containing the high gadolinia concentrations. The 1986 outage lasted from January 28, 1986, to March 24, 1986, while the 1987 outage lasted from March 28, 1987, until June 16, 1987. Both outages were refueling outages and, for both operating periods, the core design liftime was achieved.

Major activities during the 1986 outage included: total reactor vessel fuel offload for the fuel element leak inspection and fuel shuffle evolutions, steam generator eddy current and secondary side tube sheet cleaning, replacement of the "C" reactor coolant pump rotating assembly, turbine and moisture separator reheater repairs, and Emergency Response Facility Information Systems (ERFIS) modifications.

Major activities during the 1987 outage included: installation of new low pressure turbine rotors with integral discs, complete core offload, fuel leak detection/reconstitution, fuel insert shuffle and reload, containment integrated leak rate testing, steam generator eddy current testing and sludge lance/ inspection. Additional outage activities consisted of heating ventilation handler (HVH) service water pipe inspection, reactor coolant pump (RCP) vibration evaluations, Regulatory Guide 1.97 modifications, emergency response facility information system and safety parameter display system (ERFIS/SPDS) implementation, traveling water screen replacement and intake bay structural repairs, safety system functional inspection testing and modifications, and environmental qualification activities. Also, the new on-site plant simulator was released for official use by the training department.

B. Inspection Activities

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

October 20 - 23 1985, in the area of an annual emergency preparedness exercise

August 18 - 19, 1986, involving a failure to secure safeguards information properly

December 16 - 18, 1986, in the area of an annual emergency preparedness exercise

February 17 - 18, 1987, in the area of a limited emergency exercise to demonstrate the effectiveness of corrective action

March 19 - April 15, 1987, involving the SSFI of the emergency power systems and emergency diesel generators

April 5 - 10, 1987, in the area of containment leak rate testing

May 4 - 8, 1987, in the area of equipment qualification

C. Investigation Review

NONE

D. Escalated Enforcement Actions

1. Civil Penalties

RHR & SI Isolation, $50,000	September 16, 1987

2. Actions Pending/Resolved

SSFI potential escalated enforcement
EQ potential escalated enforcement

3. Orders

NONE

4. Enforcement Conferences

Transportation/High Rad Area (SL III, No CP)	May 16, 1986
RHR & SI Isolation	June 26, 1987
SSFI /Electrical Distribution /Appendix R.	June 26, 1987

5. Confirmation of Action Letters (CALs)

NONE

E. Management Conferences

Management meeting to discuss results of SALP	January 23, 1986
Meeting to discuss the January 28, 1986 loss of offsite AC power, Region II	March 11, 1986
SSFI followup meeting, Region II	April 15, 1987
Management meeting to discuss E.Q. issues prior to startup of H. B. Robinson, Region II	May 19, 1987

F. Licensee Event Report Cause Analysis

During the assessment period, 32 LERs for the unit were analyzed. The distribution of these events by cause, as determined by the NRC staff, was as follows:

Cause	
Component Failure	6
Design	7
Construction, Fabrication, or Installation	1
Personnel:	
- Operating Activity	7
- Maintenance Activity	2
- Test/Calibration Activity	5
- Other	3
Out of Calibration	0
Other	1
TOTAL	32

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

G. Licensing Activity

1. Licensing Actions Completed During This SALP Period

Licensing actions consisted of Technical Specifications amendment requests, exemption requests, responses to generic letters, TMI NUREG - 0737 items, and other actions.

2. NRR-Licensing Meetings

ISFSI Meeting at Silver Spring	11/18/85
Licensing issues meeting at HBR	12/17/85
ISFSI meeting at Silver Spring	01/08/86
IST SER meeting at Bethesda	01/09/86
BIT TS meeting at Bethesda	03/06/86
ISFSI meeting at Silver Spring	03/19/86
Meeting to discuss PTS calculational methods and HU/CD curve at Bethesda	04/30/86
Follow up PTS meeting in Bethesda	05/06/86
Open issues meeting at Bethesda	05/28/86
IST meeting in Bethesda	06/12/86
Open Issues/AEOD meeting re: loop at HBR	07/29/86
Open issues meeting (Prunty, Floyd, Rubenstein, Bud) at Bethesda	08/28/86
3 - Loop meeting in Bethesda	10/16/86
Open issues meeting at HBR	11/12-13/86
ISFSI meeting at Silver Spring	12/02/86
Exxon/NRC/CP&L Gadolinia demonstration meeting	12/10/86
PTS meeting at Bethesda	12/18/86
Open issues meeting in Bethesda	02/18/87
Priority Licensing issues meeting in Bethesda	03/24/87
PM at HBR2 for SSFI exit	03/27/87
Open issues meeting in Bethesda	04/21/87
EQ audit at HBR2 (PM in attendance)	5/7-8/87
PRA meeting in Bethesda	05/12/87

3. NRR Site Visits

Licensing status meeting & plant tour	12/17/85
Badging, training & site visit	03/20/86
PM & Management Plant tour	04/04/86
Open licensing issues/AEOD meeting Re: Loop	07/29/86
Open licensing issues & Plant tour	11/12/86
SSFI exit meeting & site tour	03/21/87
HBR2 EQ Audit	05/7-8/87

4. Commission Briefings

NONE

5. Schedular Extensions Granted

NONE

6. Reliefs Granted

IST - Pump & Valves	12/23/85
Containment ILRT duration	12/31/86
ISI SW Heat Exchangers, Pressurizer Nozzles & Flanges	11/01/86

7. Exemptions Granted

Appendix R III.G.2 & III G.3	09/11/86
Appendix J Test Program	04/08/87
Appendix R III.G.2	05/22/87

8. License Amendments Issued

18 Amendments issued (Amendments 96 - 113)

H. Enforcement Activity

1. Violations vs. Functional Areas

FACILITY SUMMARY

FUNCTIONAL AREA	D	Severity Levels V	IV	III	II	I
A. Plant Operations	0	0	1	1*	0	0
B. Radiological Controls	0	0	2	1	0	0
C. Maintenance	0	1	0	0	0	0
D. Surveillance	0	0	0	0	0	0
E. Fire Protection	0	0	0	0	0	0
F. Emergency Preparedness	0	0	1	0	0	0
G. Security	0	0	1	0	0	0
H. Outages	0	0	1	0	0	0
I. Quality Programs and Administrative Controls Affecting Quality	0	0	0	0	0	0
J. Licensing Activities	0	1	0	0	0	0
K. Training	0	0	0	0	0	0
L. Engineering Support	0	0	0	0	0	0
TOTALS	0	2	6	2	0	0

*Issued subsequent to assessment period.

2. Number and Severity Level of Violations

Severity Level	Unit 2
Severity Level III	2
Severity Level IV	6
Severity Level V	2
Deviations	0
Totals	10

I. Reactor Trips

Eight reactor trips were initiated with power greater than 15% power during this evaluation period.

January 15, 1986 - An instrument bus spike caused by a loose connection in the control loop comparator, in conjunction with surveillance testing on the steam generator level protection system, resulted in a turbine trip/reactor trip from 75% power due to high level in the "A" steam generator.

January 21, 1986 - A deficient multipin connector in a pressurizer level channel resulted in the inadvertent grounding of the circuit while trouble shooting the pressurizer level instrumentation. This resulted in a reactor trip from 72% power.

January 22, 1986 - While resetting the nuclear instrumentation system trip setpoints, a personnel error resulted in the mispositioning of two of the four bistables, thus causing a reactor trip from 33% power.

January 28, 1986 - Following the loss of emergency bus E-2 as a result of a blown fuse on the undervoltage relay and the subsequent loss of off site power, a reactor trip occurred from 80% power due to high pressurizer pressure caused by the resulting main generator load rejection.

June 20, 1986 - Coincident with the biweekly Tavg and delta T protection channel testing of one loop, an unsoldered wire connection between two variable resistors in the N-41 circuitry resulted in a reactor trip from 98% power due to a overpower delta T 2-out-of-3 logic signal.

August 25, 1986 - Following the loss of both heater drain pumps, in an attempt to stabilize the plant, a control operator opened and then inadvertently left open the emergency boration valve. The resultant overboration caused a reactor trip from 42% power due to low pressurizer pressure.

September 10, 1986 - During the conduct of a maintenance surveillance test on the steam generator pressure protection system, a control operator failed to position properly a selector switch to the channel not in test. With the steam flow channel being tested still controlling, the steam generator level control system sensed a loss of steam flow and compensated by closing the feedwater regulating valve for the affected steam generator, thus causing a reactor trip from 100% power due to low level coincident with steam flow greater than feed flow.

December 22, 1986 - The mechanical failure of the feedback linkage on the "B" feedwater regulating valve caused its positioner to sense that the valve was closed and attempted to actuate the valve open. The resultant overfeeding of the "B" steam generator caused a turbine trip/reactor trip, due to high steam generator level, from 100% power.

Two reactor trips were initiated with power less than 15% power during this evaluation period.

March 22, 1986 - During startup from a refueling outage, a turbine trip/reactor trip occurred at 13% power due to high level in the "B" steam generator. This trip was attributed to the combined effects of the "B" steam generator not being able to control in automatic due to transmitter sensing line problems (feed flow tubing inadvertently reversed, and steam flow tubing clogged) and the failure of control operators to anticipate the decrease in the controlling bank rod worth on plant control during initial turbine loading.

March 24, 1986 - During plant startup from a refueling outage, the failure of control operators to open at least one of the turbine governor valves sufficiently during startup to clear a shut position limit switch within one minute of closing the grid circuit breaker, resulted in a reactor trip from 10% power.

Five reactor trips were initiated with the unit subcritical during the evaluation period:

January 30, 1986 - During plant cooldown, in preparation for a refueling outage, a reactor trip was initiated by a high steam line differential pressure safety injection (SI) signal produced when a control operator failed to block the SI actuation signal during cooldown, as required by procedure.

March 18, 1987 - While the unit was shutdown for refueling, a spurious signal (instrument spike) was received by the reactor protection system (P-7 permissive) which actuated the shutdown banks.

May 27, 1987 - Subsequent to a refueling outage and during plant heatup, the combination of a incorrectly wired safeguards relay in conjunction with a simulated pressurizer pressure signal generated during a reactor protection logic surveillance test satisfied the 2-out-of-3 logic which initiated a trip at 0% power.

May 29, 1987 - While heating up the Reactor Coolant System, following a refueling outage, the failure of a SOLA transformer for instrument bus 4 resulted in the loss of voltage to the instrument bus. The loss of voltage caused a reset of the P-7 permissive which normally

blocks several reactor trip signals below 10% power. The resetting of the P-7 permissive resulted in a reactor trip from pressurizer low pressure.

June 4, 1987 - With the unit in cold shutdown, an inadvertent resetting of the P-7 permissive resulted in a reactor trip. The P-7 permissive came in due to a decrease in voltage on the instrument bus which occurred while starting the "B" reactor coolant pump. At the time of the event, the instrument bus was being fed from a non-regulated, alternate power supply, MCC-8, due to a failed SOLA transformer - see May 29, 1987 event described above.

J. Effluent Summary

	1984	1985	1986
Gaseous Effluents*			
Fission and Activation Gases	1.04 E+2	2.72 E+3	6.59 E+2
Iodine and Particulates	6.38 E-4	1.52 E-2	1.09 E-2
Tritium	2.22	8.85 E+1	9.66
Liquid Effluents*			
Fission and Activation Products	4.07 E-1	2.43 E-1	2.01 E-1
Tritium	1.34 E+1	3.09 E+2	3.42 E+2
Whole Body Dose (person-rem)	1.89 E-2	4.59 E-1	2.32 E-01

* Curies