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ENCLOSURE
INTERIM SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION
REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE

INSPECTION REPORT NUMBER

50-261/88-29

CAROLINA POWER AND LIGHT COMPANY

H. B. ROBINSON

July 1, 1987 - October 31, 1988

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I. INTRODUCTION

The Systematic Assessment of Licensee Performance (SALP) program is an integrated NRC staff effort to collect available observations and data on a periodic basis and to evaluate licensee performance on the basis of this information. The program is supplemental to normal regulatory processes used to ensure compliance with NRC rules and regulations. It is intended to be sufficiently diagnostic to provide a rational basis for allocation of NRC resources and to provide meaningful feedback to the licensee's management regarding the NRC's assessment of their facility's performance in each functional area.

An NRC SALP Board, composed of the staff members listed below, met on December 19, 1988, to review the observations and data on performance, and to assess licensee performance in accordance with Chapter NRC-0516, "Systematic Assessment of Licensee Performance." The guidance and evaluation criteria are summarized in Section III of this report. The Board's findings and recommendations were forwarded to the NRC Regional Administrator for approval and issuance.

This report is the NRC's assessment of the licensee's safety performance at H. B. Robinson for the period July 1, 1987 through October 31, 1988.

The SALP Board for H. B. Robinson was composed of:

- C. W. Hehl, Deputy Director, Reactor Projects Division (DRP), Region II (RII) (Chairman)
- A. F. Gibson, Director, Division of Reactor Safety (DRS), RII
- D. M. Collins, Acting Director, Division of Radiation Safety and Safeguards (DRSS), RII
- D. M. Verrilli, Chief, Reactor Projects Branch 1, DRP, RII
- E. G. Adensam, Director, Project Directorate II-1, Office of Nuclear Reactor Regulation (NRR)
- L. W. Garner, Senior Resident Inspector, Robinson, DRP, RII
- R. Lo, Senior Project Manager, Project Directorate II-1, NRR

Attendees at SALP Board Meeting:

- R. E. Carroll, Project Engineer, Project Section 1A, DRP, RII
- R. M. Latta, Resident Inspector, Robinson, DRP, RII
- L. P. Modenos, Project Engineer, Technical Support Staff (TSS), DRP, RII

A. Licensee Activities

During this assessment period, the unit was critical for approximately 9487 hours and maintained an average availability factor of 79.7%. During the period, the forced outage rate was 20.2%, which is substantially higher than the 5.5% during the previous assessment period and greater than the 15% historical cumulative rate.

This assessment period involved six reactor trips from greater than 15% power and an additional 14 forced outages. The large number of outages were distributed over the assessment period such that the length of runs between outages were 73 days, 70 days, 50 days, 42 days, 34 days and the remaining 15 were 20 days or less. No refueling outage occurred during the assessment period. The operating history during this assessment period is summarized below.

The unit began the assessment period at 100% power. On July 10, 1987, the reactor tripped from 100% due to steam/feed flow mismatch coincident with low steam generator level. An electrical short in the A feedwater regulating valve had caused the valve to fail closed. The problem was corrected and the unit returned to service on the same day.

On July 12, 1987, the unit was shut down in accordance with Technical Specifications when unidentified reactor coolant leakage exceeded 1 gpm for 12 hours. This condition also caused an unusual event to be declared at 9:45 p.m. Upon repacking valve RC-586, the pressurizer steam space sample valve, the unusual event was terminated at 4:00 a.m. on July 14, 1987, and the unit returned to service on July 15, 1987.

On July 16, 1987, a reactor trip occurred from 72% power when the A feedwater regulating valve malfunctioned. The valve positioner was replaced and the unit returned to power the same day. During the subsequent power ascension on July 17, 1987, problems with the A feedwater regulating valve again required the unit to be removed from service. Upon completion of repairs, the unit was returned to service on July 17, 1987.

On August 4, 1987, results of environmental testing of a Cruise-Hinds penetration splice configuration indicated excessive current leakage. The unit was shutdown for replacement of 46 splices. The unit was taken critical on August 10, 1987, and was in power ascension when the unit tripped from 8% power due to a replaced immediate range monitor setpoint being out of tolerance. The unit was returned to service on August 11, 1987.

An electro-hydraulic (E-H) oil leak on August 18, 1987, resulted in removal of the unit from service to facilitate repairs. The unit was returned to service the same day. On August 27, 1987, the unit had to again be removed from service to repair an E-H oil leak.

Power operation resumed on August 28, 1987, and continued until September 10, 1987, when the unit was removed from service to repair a leak in the turbine generator's hydrogen cooler. Power production resumed on September 19, 1987.

On September 28, 1987, a personnel error during surveillance testing resulted in both trains of the reactor protection system being placed in the test position. This resulted in a reactor trip from 100% power. The unit was returned to service the following day.

On November 4, 1987, the unit experienced a turbine runback from 100% power to approximately 60% power due to a false rod drop indication generated by loss of power to one of the power range channels. A momentary loss of power to safety related motor control center MCC-6, due to personnel error, initiated the event. The unit was subsequently returned to 100% power.

On November 9, 1987, the unit was shutdown to repack valve RC-554C, the loop C hot leg RTD bypass manifold isolation valve. The unit was returned to service the next day.

On January 19, 1988, after a power reduction to 66% to perform surveillance testing on the turbine overspeed trip, the unit tripped on low autostop oil pressure. Performance of the surveillance in conjunction with an excessive leaking autostop oil relief valve was determined to be the cause of the low oil pressure. The unit returned to service on the following day.

On January 29, 1988, the unit was shutdown due to the discovery of single failures which could reduce the number of safety injection pumps to less than the two assumed in the approved safety analysis. Analysis was performed which indicated that operation up to 1380 Mwt was acceptable with only one safety injection pump available to mitigate the consequences of certain accidents. The licensee installed plant modification 951 to remove the autostart feature of the B safety injection pump while retaining the autostart feature of the A and C pumps. On March 7, 1988, the licensee was granted an emergency Technical Specification change which authorized power operation up to 1380 Mwt (derating to 60% power). Reactor heatup was commenced on the same day. Power operation at 60% power resumed on March 11, 1988, after turbine overspeed trip testing. On April 22, 1988, a hardware failure in the E-H turbine control system resulted in the 1380 Mwt power limitation being exceeded by approximately 4.5%. Prompt operator action returned the power to 1380 Mwt within three minutes.

On April 29, 1988, the unit was taken to hot shutdown to repair valve RC-557C, the loop C cold leg RTD bypass manifold isolation valve. During repair efforts, the leakage from the reactor coolant system exceeded the 10 gpm emergency action level for an unusual event classification. An unusual event was declared at 6:10 p.m. on April 30, 1988, and was terminated at 10:00 p.m. on the same day after leakage had been reduced to less than 10 gpm.

The unit was returned to 60% power on May 2, 1988. Later that day, problems in the E-H oil system and governor valve position limiter resulted in a turbine trip/reactor trip. After repairs, the unit was returned to service on May 6, 1988.

On May 12, 1988, failures in one channel of the turbine redundant overspeed trip system, coupled with surveillance testing on another channel, resulted in a turbine trip/reactor trip from 60% power. Upon completion of repairs the unit was returned to service on May 15, 1988. On June 19, 1988, the unit was taken to zero power to perform testing of this system. The unit was returned to service the same day.

On June 20, 1988, the NRC issued Technical Specification Amendment 119 which authorized power operation at 2300 Mwt (the power limit prior to the March 7, 1988 unit derating). Approval of the return to full power operation was based upon a revised safety analysis performed by Westinghouse which demonstrated that the emergency core cooling system acceptance criteria of 10 CFR 50.46 would be met with only one safety injection pump being available to mitigate the consequences of an accident. Full power operation at 2300 Mwt was obtained on June 24, 1988.

On August 31, 1988, the licensee determined that high differential and low exit service water pressures on containment fan coolers 3 and 4 potentially rendered these coolers inoperable. Per Technical Specifications the unit was shutdown. Subsequent inspection revealed biological fouling had occurred. Upon cleaning the four containment fan coolers and inspecting the other safety related heat exchangers, the unit was returned to service on September 19, 1988.

On September 22, 1988, the unit was shutdown when both the inboard and outboard containment exhaust purge valves were determined to be leaking by their seats. Because containment integrity could not be established within four hours, an unusual event was declared at 7:21 a.m. in accordance with the emergency plan. Upon repair of the outboard valve, the unusual event was terminated at 9:45 p.m. The unit was returned to service on September 24, 1988, after completing repairs on the inboard valve.

On October 14, 1988, the unit was taken to cold shutdown to allow replacement of the power cables from emergency bus E-2 to safety related MCC-6. Based upon preliminary engineering calculations, it could not be demonstrated that these cables had not exceeded their useful lifetime. After the shutdown, a heat transfer model reflecting actual cable configurations demonstrated that the cables had been acceptable. The cable replacement was performed, however, and the unit returned to power on October 18, 1988.

On October 28, 1988, the unit was shut down to replace nonenvironmentally qualified splices inside containment. The 24 non-qualified splices rendered all four containment fan coolers inoperable. The unit was returned to service on October 29, 1988. At the end of the assessment period the unit was at 92% power in a coast down mode preparing for the scheduled November 12, 1988 refueling outage.

The licensee instituted several management changes during the assessment period. New personnel filled the Robinson Nuclear Project Department Manager, Control and Administration Manager, and Operation Manager positions. The duties of the Technical Support Manager was assigned to the Design Engineering Manager.

B. Direct Inspection and Review Activities

During the assessment period, routine inspections were performed at the Robinson facility by the NRC staff. Special inspections were conducted as follows:

- July 27-28, 1987; a special inspection was performed to review the circumstances surrounding an unauthorized, unsearched, unbadged person's entrance into the protected area.
- December 7-11, 1987; a special Regulatory Effectiveness Review was conducted to assure that safeguards implementation at the site met NRC performance objectives.
- January 11-15, and January 25-29, 1988; a special quality verification inspection was conducted in the areas of maintenance, design control, operations, commercial grade procurement and quality assurance/quality control.
- February 12-13, 1988; a special inspection was conducted to verify the ability to automatically start two safety injection pumps after modifications to starting circuits.
- September 12-16, October 3-5, 1988; a special inspection was conducted to assess the licensee's program for maintaining radiation exposures as low as reasonably achievable.

II. SUMMARY OF RESULTS

H. B. Robinson has been operated in an overall safe manner during the assessment period. There were no major weaknesses identified. A major strength was identified in the area of security.

The plant experienced a significant reduction in the number of reactor trips during low power or shutdown conditions, whereas the number of at power trips remained approximately the same as that experienced in the last assessment period. Although the total number of trips is still

relatively high, the low number resulting from operations personnel errors is indicative of management attention in this area. Implementation of the fire protection program was adequate. Frequently accessed portions of the plant were maintained in a high state of cleanliness. Management changes at the plant and site provided a new outlook and ideas for plant performance.

The overall quality of the health physics staff was considered as a strength. The amount of contaminated areas in the plant has continued to be reduced such that the contaminated area percentage was among the lowest in Region II. Although cumulative exposure decreased during this period, it still remained high. An effective program for reducing the volume of solid radioactive waste shipped offsite was implemented.

Performance in the maintenance/surveillance area was mixed. Although preventive maintenance has increased with a corresponding decrease in corrective maintenance, a large number of the forced outages and the reactor trips were attributed, at least partially, to hardware failures. Even so, the overall maintenance backlog continued to decrease during the assessment period. The microbiological induced corrosion program was stronger and more thorough at the end of the assessment period. An effective valve repacking program led to improvement in valve packing performance. The number of violations increased in this combined area, from the last assessment period.

Although a full scale emergency exercise demonstrated that the licensee could implement the emergency response program, three exercise weaknesses were identified. A subsequent inspection revealed an additional weakness in the identification of emergency action levels. The licensee maintained a capability for prompt communication with onsite and offsite support organizations.

A strong security program continued to be maintained at the site. The security plan has required only minimal revision. Site and corporate security management were responsive to security program needs. One Severity Level III violation was considered as an isolated event.

Site management reacted positively to the engineering/technical support deficiency identified during the previous assessment period. A Design Basis Documentation program has been initiated to improve the design basis knowledge of the plant. An additional management effort was the initiation of a Design Change Reduction Program. The overall technical capability of the engineering staffs was good, although the system engineering staff was overloaded, resulting in reduced attention to routine daily operations. The site was the pilot plant for the operator requalification program and the training staff was highly cooperative and contributed to a good NRC/CP&L working environment.

With respect to the safety assessment/quality verification area, several aspects of plant performance were assessed. A Quality Verification Functional Inspection identified several strengths and one weakness. QA surveillances have continued to shift from documentation review to more performance-based reviews. Licensee Event Report content improved significantly from the previous assessment period. A weakness existed in the development of the full scope of emergent issues; however, once an issue was identified as a significant problem area, management attention and commitment was strong and positive.

There was good progress in reducing the overall backlog of licensing related issues. The licensee was increasing its pace in resolving several major licensing issues; but at the same time, was very slow in addressing others. Safety analysis submittals were generally of high quality and thorough; however, the No Significant Hazards Considerations were addressed with less care. The licensee demonstrated a conservative approach to safety as evidenced by several shutdowns and a delayed startup resulting from self-initiated engineering reviews.

Overview

[November 1, 1985 Through June 30, 1987]

<u>Functional Area</u>	<u>Rating Last Period</u>
Plant Operation	2
Radiological Controls	2
Maintenance	2
Surveillance	1
Fire Protection	2
Emergency Preparedness	2
Security	1
Outages	1
Quality Programs and Administrative Controls Affecting Quality	2
Licensing Activities	2
Training	2
Engineering Support	3

[July 1, 1987 Through October 31, 1988]

<u>Functional Area</u>	<u>Rating This Period</u>
Plant Operations (operations & fire protection)	2
Radiological Controls	2
Maintenance/Surveillance	2
Emergency Preparedness	2
Security	1
Engineering/Technical Support (engineering, training & outages)	2
Safety Assessment/ Quality Verification (quality programs & licensing)	2

III. CRITERIA

Licensee performance is assessed in selected functional areas, depending on whether the facility is in a construction or operational phase. Functional areas normally represent areas significant to nuclear safety and the environment. Some functional areas may not be assessed because of little or no licensee activities or lack of meaningful observations. Special areas may be added to highlight significant observations.

The following evaluation criteria were used, as applicable, to assess each functional area:

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

However, the NRC is not limited to these criteria and others may have been used where appropriate.

On the basis of the NRC assessment, each functional area evaluated is rated according to three performance categories. The definitions of these performance categories are as follows:

1. Category 1. Licensee management attention and involvement are readily evident and place emphasis on superior performance of nuclear safety or safeguards activities, with the resulting performance substantially exceeding regulatory requirements. Licensee resources are ample and effectively used so that a high level of plant and personnel performance is being achieved. Reduced NRC attention may be appropriate.
2. Category 2. Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are good. The licensee has attained a level of performance above that needed to meet regulatory requirements. Licensee resources are adequate and reasonably allocated so that good plant and personnel performance is being achieved. NRC attention may be maintained at normal levels.
3. Category 3. Licensee management attention to and involvement in the performance of nuclear safety or safeguards activities are not sufficient. The licensee's performance does not significantly exceed that needed to meet minimal regulatory requirements. Licensee resources appear to be strained or not effectively used. NRC attention should be increased above normal levels.

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 discernable 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 and the licensee had not taken meaningful steps to address this pattern.

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

During the assessment period, inspections of plant operations and fire protection were performed by the NRC staff.

Management involvement and commitment to assuring quality was evident in the areas of preplanning, staffing, procedural rewrites and enhancements, which included Operations Management

Manual revisions, improved interface with maintenance and outage planning, and establishment of priorities. Plant management maintained an active involvement in the daily activities of plant operations and routine unit manager meetings were conducted to discuss corrective actions for abnormal plant events. These meetings, in addition to addressing management issues, were often technical in nature and acted to facilitate the interdisciplinary resolution of complex event recovery. Tracking of repair efforts for known equipment functional and operability deficiencies were efficient and a listing of priority items was maintained for resolution during forced outages.

During the latter part of this assessment period a new Robinson Nuclear Department Manager was selected. His extensive experience as the former plant manager at Brunswick provides a new perspective. Additionally, the previous Manager of Planning and Scheduling, was selected as the new Manager of Operations. The latter selection provided additional management emphasis in the operations area.

The operations staff is composed of six shifts which were fully manned. The work force was very stable with a negligible turnover rate. Efforts to diversify the opportunities for operations personnel and expand operational expertise resulted in SRO rotation into both training and regulatory compliance groups on site, as well as active participation in INPO peer evaluations and QA audits of other CP&L facilities. This effort aided in providing new insights and sensitivity to the operations staff relative to training, maintenance activities, planning, and familiarity with changing industry and regulatory issues. Additionally, 14 SRO licenses were maintained by licensee management personnel which added operational insights to many management decisions.

Efforts to provide control room upgrade continued with emphasis on modifications to the control operator's station and the shift foreman's work area to address human factors concerns. Also, during this assessment period both the Safety Parameter Display System (SPDS) and the Emergency Response Facility Information System (ERFIS) have been declared operational and have had a cumulative availability factor of 98.8%.

The effectiveness of operations personnel training and qualifications relative to facility knowledge and response to plant off-normal conditions was demonstrated by the efficient response to several operational events during the assessment period. Specifically, these events involved the prompt actions of operations personnel in avoiding a turbine/reactor trip on September 27, 1988, and the identification and correction of controller problems on a feedwater regulating valve which caused two turbine/reactor trips in July of 1987.

The licensee's approach to the resolution of technical issues was typically good, with operations management and personnel involved in programs intended to improve plant safety and operations. Examples of these efforts included rewriting of the Abnormal Operating Procedures, improvements in the Emergency Action Level Identification procedures, participation in Corporate Quality Assurance (QA) audits of other CP&L facilities, and the assignment of system responsibility to specific operations personnel. These efforts resulted in operations participating more decisively in integrated plant issues and consequently strengthened the organization. However, operating personnel were not always aggressive in insisting that malfunctioning equipment was expeditiously repaired. Examples of this are nuisance type annunciators and malfunctioning control board indicators.

Control room demeanor was informal and casual, though effective. Communications among operations personnel and with other groups were acceptable. However, within operations, communications were not always performed in accordance with CP&L's Operator's Code of Conduct. The operations staff exhibited a strong understanding of plant configuration and pride in their operational expertise. Unfortunately, in some instances, this led to the attitude that procedures provide guidance, but that their usage is somewhat interpretative. This weakness was observed by two separate NRC operator examination teams. The teams identified that several of the candidates were reluctant to consult procedures while performing routine evolutions. There was also hesitation exhibited in referring to Annunciator Response Procedures.

Within the area of responsiveness to NRC initiatives, the operations department was generally receptive and cooperative in addressing identified issues. Because of the vintage of the plant, there existed a reliance on previously accepted methods and practices which are not necessarily in close agreement with current industry concepts. This condition was recognized by plant management and steps were initiated to correct this problem. These included emphasis on operator professionalism, adoption of a formal Code of Conduct and a proposed utilization of standard attire.

The unit experienced seven reactor trips as compared to fifteen in the previous assessment period. Of the seven reactor trips, five were related to component failures, one involved a procedural deficiency, and one was attributed to a non-licensed personnel error. In the previous assessment period, four reactor trips were attributed to licensed personnel. None of the seven trips experienced during this assessment period were

caused by licensed personnel. The five reactor trips involving component failures were attributable to natural aging of components and inadequate preventative/predictive maintenance.

Corrective action for the one reactor trip associated with a procedural deficiency resulted in modifying the operations work procedure to ensure that the high flux trip setpoint for replacement intermediate range detectors is bypassed during startup until the proper intermediate range setpoint can be established. The remaining reactor trip, which was attributed to a cognitive personnel error while performing a maintenance surveillance test of the reactor protection logic trains, appears to be an isolated case. The licensee took adequate corrective action to preclude the recurrence of this event.

The licensee's administrative control procedures for controlling fire hazards within the plant and establishing training requirements for the plant fire brigade were found to meet NRC requirements and guidelines, and were adequate to implement the licensee's fire protection program.

The licensee's implementation of the fire prevention administrative controls, and the control of combustible and flammable materials in safety related areas of the plant were considered excellent. Housekeeping in most of the plant was considered good to excellent. Notable exceptions included the Boron Injection Tank room, the RHR pit, and behind and/or under major equipment inside containment. The latter areas were sometimes found to be marginally adequate. The fire protection extinguishing systems, fire detection system, and fire barrier assemblies protection systems required for safe shutdown were functional. In addition, the surveillance inspection, tests and maintenance instructions for the plant fire protection systems were satisfactory and met the criteria of the Technical Specifications.

The licensee's fire brigade organization, staffing, and training met NRC requirements. The training and drills for the fire brigade members met the frequency specified by plant procedures. The effectiveness of the fire brigade emergency response was also evaluated during unannounced drills observed by the NRC staff. The drills identified several areas where improvements could be made; however, overall brigade and brigade leader performance in the drills was very good and indicated that the capability to effectively respond to emergency fire events was maintained. The observed drills were considered realistic and successfully demonstrated the ability to respond to postulated conditions.

Staffing for the onsite fire protection group in support of operations was very good. The group was knowledgeable of fire protection issues and has adequate manpower to implement the fire protection program. The staffing included a Fire Protection Shift Technical Aide who provided around-the-clock direct on-shift administrative and technical assistance to the plant operations organization. This position provided a very effective resource to address ongoing fire protection related activities and thereby enhanced the safe operation of the plant.

In general, the management involvement and control in assuring quality of the fire protection program was evident based upon their involvement in the site fire protection program to ensure compliance with NRC requirements and prompt resolution of any identified weaknesses. Additionally, the licensee's responsiveness to NRC initiatives were technically sound and thorough in most cases.

No violations of NRC fire protection related requirements were identified during this assessment period. However, during the previous assessment period, a Safety System Functional Inspection (SSFI) conducted at the facility did identify deficiencies in the fire protection area which resulted in the Severity Level III violation listed as a. below. Specifically, escalated enforcement pertaining to full implementation of Appendix R requirements concerning adequate plant procedures, training communications, and emergency lighting was issued and responded to by the licensee during this assessment period. Since the related civil penalty received during this assessment period was for Appendix R deficiencies identified in the previous assessment period, it has not been factored into the rating for this assessment period. The effectiveness of the corrective actions for this violation has not been assessed.

Overall, the enforcement history in the plant operations area has improved significantly. There were only two minor violations that were actually identified during this assessment period. The licensee did receive a civil penalty during this assessment period (violation b. below) for the isolation of Low Pressure Safety Injection. However, like the Appendix R civil penalty discussed above, this problem of mispositioned valves was identified in the previous assessment period and has, therefore, not been factored into the rating for this assessment period. The licensee did take corrective action on this issue, and no other occurrences of mispositioned valves have since been identified.

Four violations were cited, with violations a. and b. being identified in the previous assessment period.

- a. Severity Level III violation for failure to adequately implement 10 CFR 50 Appendix R requirements. (261/87-06)
- b. Severity Level III violation involving the mispositioning of valves which resulted in the isolation of Low Pressure Safety Injection. (261/87-15)
- c. Severity Level IV violation for failure to report the inoperability of emergency diesel generators per 10 CFR 50.72. (261/88-01-01)
- d. Severity Level IV violation for failure to maintain records relating to diesel generators. (261/88-01-03)

2. Performance Rating

Category: 2

3. Recommendations

None

B. Radiological Controls

1. Analysis

During the assessment period, inspections were performed by the NRC staff. Included in these inspection efforts were three radiation protection inspections, including one special assessment of the licensee's program for maintaining radiation exposures as low as reasonably achievable (ALARA), one radiological effluent inspection, and a confirmatory measurements inspection using the Region II mobile laboratory.

The licensee's health physics and radioactive waste staffing levels were appropriate and compared favorably with other utilities having a facility of similar size. An adequate number of ANSI qualified licensee and contract health physics technicians were available to support routine and outage operations. Key positions in the environmental surveillance organization were also filled with qualified staff.

The performance of the health physics staff in support of routine and outage operations, as well as the knowledge and experience level, were good. This was the result of, at least in part, a low turnover rate for the staff and little reliance on contract personnel except during outage operations. The overall quality of the staff was a program strength.

The licensee's HP technical training program was effective. The general employee radiation protection training program was well defined and applied to all staff members. Management's support of, and commitment to, training were evident in that sufficient time was allocated for training and employees were encouraged to attend training sessions.

Management support and involvement in matters related to radiation protection and radwaste control were good. This was evidenced by the continued commitment to maintain the routinely accessed portions of the facility as radiologically and physically clean as possible. Management support was also evidenced by the acquisition of new equipment and radioactive sources for calibration of radiation monitoring instrumentation, which improved the calibration program and reduced the radiation dose to technicians. Appropriate members of both management and the technical staffs were involved sufficiently early in outage preparations. This permitted proper identification of work scope, provided for adequate planning of radiological controls, and allowed for ALARA review of the various outage projects and activities to be performed.

The licensee was responsive to NRC initiatives, as evidenced by the development of a program to correlate performance in General Employee Training with on-the-job compliance with radiological control requirements. The licensee also has developed a training program for individuals who needed further radiological controls training following minor problems noted in procedure compliance or work practices. Although the licensee has not identified discrete radioactive particle contamination at the plant, they have developed a program to control, quantify, and determine the radioactive dose from such particles.

During the assessment period, the licensee's resolution of technical issues was generally good. However, as discussed in Section C of this report, continuing problems with the Environmental and Radiation Control (E&RC) building sump pump controllers and high level alarm system resulted in radioactive liquid being discharged to an on-site settling pond.

The licensee's program for controlling radioactive solid waste material was generally good. However, violation b. below was identified during the assessment period involving the release of a contaminated dry storage canister mockup to an offsite vendor who was not authorized to receive radioactive material. The radioactive material release was the result of an inadequate release survey. Once the problem was discovered, however, the licensee's response was excellent.

The licensee's radiation work permit and respiratory protection programs were found to be satisfactory. There were 99 skin contaminations and 132 clothing contaminations reported during 1987. As of October 31, 1988, the licensee had reported 39 skin contaminations and 76 clothing contaminations. Although the number of personnel contaminations declined in 1988, no refueling outage, which is where most personnel contaminations occur, took place during the assessment period.

During 1987, the annual average number of square feet maintained as contaminated by the licensee was approximately 2,700, or approximately three percent of the radiologically controlled area (RCA) of the plant, excluding the containment vessel. As of October 31, 1988, the licensee had reduced the number of contaminated square feet to approximately 1,700, or about two percent of the RCA, which was among the lowest in Region II.

The licensee's collective radiation dose was 499 person-rem for 1987, as compared to a licensee-established goal of 450 for the year. The 1987 exposure total was well above the 1987 PWR national average of 368 person-rem per unit. The goal for 1988 was again established at 450 person-rem, but due to an increase in outage work scope after the goal was established, the licensee anticipated that the goal will again be exceeded. Jobs to be worked that were not originally included in the outage projection included RTD bypass elimination and service water piping removal/replacement/relocation. The licensee anticipated that these projects will result in a reduction in collective dose in the future. The revised projected dose expenditure for 1988 was 575 person-rem. Consequently, the collective radiation dose will be well above the PWR national exposure average for calendar year 1988.

Near the end of the assessment period, the NRC performed a special evaluation of the licensee's ALARA program. Although most of the elements of an effective ALARA program were in place, the overall effectiveness of the program in reducing the station's collective radiation dose is yet to be demonstrated. The assessment team found a high level of plant and corporate awareness of the ALARA program; however, strong corporate management direction for the program was not evident. The five year business plan for the plant does not project that the collective dose will be at or below the industry norms even by 1992. The licensee has taken a number of initiatives to reduce the collective dose, including source term reduction, active participation in industry study groups, the incorporation of annual dose goals as an element in individual management's performance appraisals, development of an ALARA Design Guide for the utility, and the development of an ALARA Design and Operations Training Program.

A confirmatory measurements inspection resulted in total agreement between the licensee's radiochemistry gamma spectroscopy equipment and the NRC mobile laboratory. The quality control program for the licensee's equipment was effective as indicated by across-the-board agreement for all compared radionuclides. Comparison for pure beta emitting radionuclides also resulted in total agreement.

Liquid and gaseous effluents for calendar year 1987 were within the dose limits specified by Technical Specifications and within the radioactivity concentrations specified in 10 CFR 20, Appendix B. Offsite doses did not exceed 10 CFR 50, Appendix I ALARA limits. The calculated maximum individual offsite dose from radioactive effluents for 1987 was 1.11 E-1 millirem total body from liquid effluents and 8.37 E-2 millirem for gaseous effluents. Maximum dose to the thyroid was 5.37 E-1 millirem from gaseous effluents. These values placed the licensee well below the 40 CFR 190.10 limit of 25 millirem annual dose equivalent to the whole body and 75 millirem to the thyroid. No abnormal offsite liquid or gaseous releases were reported during 1987 or the first 6 months of 1988. Liquid and gaseous effluents for 1985 through 1987 are summarized in section V.I. of this report.

The licensee has implemented an effective program for reducing the volume of solid radioactive waste shipped to low level radioactive waste shallow burial facilities. The total volume shipped for burial in 1987 was approximately 22 percent of the volume shipped in 1986. The reduction is largely due to the licensee's use of a vendor who performs supercompaction of the dry waste generated at the plant. The licensee anticipated further reductions in 1988.

Three violations were identified.

- a. Severity Level IV violation for failure to adhere to radiation protection procedures concerning wearing of protective clothing and frisking. (261/87-24-01)
- b. Severity Level IV violation for failure to perform an adequate survey prior to releasing material. (261/88-02-01)
- c. Severity Level V violation for failure to properly identify the physical form of radioactive waste on shipping papers. (261/88-28-10)

2. Performance Rating

Category: 2

3. Recommendations

The ALARA program to date has not been completely effective in reducing collective dose and is not projected to be effective in the site's established 5 year business plan. As expressed in the previous SALP report, the Board remains concerned that the collective dose at the site continues to be high and it appears that future collective dose goals do not reflect an aggressive ALARA program. Accordingly, increased management attention is warranted in this area.

C. Maintenance/Surveillance

1. Analysis

During the assessment period, routine and special inspections were conducted by the NRC staff.

Management involvement in assuring quality in the maintenance and surveillance area increased during the assessment period. Maintenance and surveillance activities, as well as corrective action programs were generally well defined and implemented with an emphasis placed on interdepartmental teamwork. Active job oversight and control in the form of maintenance supervision at the job site was observed throughout the reporting period. The maintenance backlog, excluding outage work, had continued to decrease during this reporting period and currently stands at approximately 525 outstanding work requests. Based on information available subsequent to the 1984 steam generator replacement outage, this backlog of outstanding maintenance work requests was the lowest in recent years.

The procedural upgrade program of Maintenance Surveillance Tests (MSTs) initiated during the previous assessment period has continued. MSTs which were identified as contributors to plant trips were modified with input from maintenance emphasizing procedural enhancements and human factors considerations. An example of this was when an inadequate reactor protection logic MST, concurrent with a cognitive personnel error, resulted in a reactor trip on September 28, 1987. The corrective action for this event included the modification of this surveillance test into four separate test procedures which has prevented recurrence of this event.

Management commitment to the assurance of quality was demonstrated by increased emphasis and continued implementation of the preventive/predictive maintenance program. This effort, as described in the licensee's Maintenance Management Manual, stressed reliability centered maintenance of plant production equipment by reducing equipment failures and downtime due to

corrective maintenance. This program also focused the responsibility for modifications and design activities on the system engineer, thereby providing a single point of contact for all related work. Management emphasis on preventive/predictive maintenance activities resulted in both an increase in preventive maintenance and a decrease in unplanned corrective maintenance.

The Automated Maintenance Management System (AMMS) was instituted during the previous SALP period to provide an automated method for work order planning, initiation, and completion documentation. It provides for the prioritization of maintenance backlogs with emphasis on items pertaining to safety related equipment and limiting conditions for operation, as well as providing scheduling aids for corrective and preventative maintenance and periodic testing and forced outage work lists. The Electronic Data Base (EDB) system augments the AMMS and incorporates system inputs from corrective maintenance history, vendor recommendations, special requirements, NPRDS, PMs, document control, performance trending, parts inventory, and planning and scheduling into a central EDB tag file. The EDB system is scheduled to be fully implemented by late 1989, and has currently been loaded with data for over 10,000 components. The combination of EDB and the existing AMMS has tended to improve the performance of the maintenance and surveillance programs.

In spite of the above efforts, the success of the maintenance program has been mixed. During this assessment period, approximately 2/3 of the 14 forced outages and 6 reactor trips were either attributed to hardware failures or hardware failures in conjunction with other problems. Specifically, balance of plant components and leaking primary system valves were the major initiators. A modification is scheduled during the November 1988 refueling outage to eliminate the RTD bypass manifold, since leaking valves on this manifold resulted in shutdowns on November 9, 1987, and April 29, 1988. The number of balance of plant problems was not indicative of an effective proactive maintenance program for this equipment. In addition, other events during the assessment period also indicated a weakness in the preventive/predictive maintenance program in identifying component failures associated with natural aging of components. Examples of these problems included a defective overspeed trip device on the A EDG; the failure of an alarm switch associated with a DB-50 supply breaker for HVH-2; and a faulted E-H relay card in the governor valve position limiter circuitry. Additionally, the failures of the predictive/preventative maintenance program to identify and correct a defective relief valve on the turbine E-H system and faulty solenoid valves associated with the turbine redundant overspeed

trip system resulted in turbine/reactor trips on January 19, 1988, and May 12, 1988, respectively. Once identified, the resolution of these and other technical issues was generally acceptable and indicated an adequate application of resources. However, a more aggressive maintenance program could have possibly prevented the July 16, 1987 reactor trip after earlier problems were experienced with the A Feedwater regulating valve.

During a review of the hydrostatic testing section of the Inservice Inspection (ISI) activities, problems were identified in the area of preparation and submittal of test reports to the NRC. Specifically, a weakness was identified in the licensee's program for the review of results of test programs conducted by contractors.

Inspections were also conducted on the Service Water Microbiological Induced Corrosion (MIC) program at the beginning and the end of the assessment period. The licensee's program at the end of the period was much stronger and more thorough than the program observed at the beginning of the period. The licensee addressed the total problem and prepared well thought out plans for correcting all of the problems, not just the obvious ones. Plant management placed increased emphasis in the area of solving the total service water problem, including being aware of recent NRC initiatives in the area of testing heat exchangers for thermal efficiency and coolant flow rates.

The licensee's action with regard to responsiveness to NRC initiatives was good. Favorable examples included the continued implementation of the erosion/corrosion program initiated during the latter part of the previous assessment period. This program was designed to identify secondary system components susceptible to this phenomenon and to monitor and repair piping systems utilizing inspections, mapping of defects, and repair/replacement activities. As a result of this program, repairs were accomplished on portions of the heater drains and vents, condensate system, steam generator blowdown recovery lines, and the moisture separator reheater drain lines. Success of the program was demonstrated by the almost complete elimination of leak repairs by Ferminite during this assessment period. Additionally, the licensee initiated an active valve repacking program utilizing Chesterton die-formed graphite packing and live loading on selected valves in both primary and secondary systems. This program has led to significant improvements in valve packing performance.

Staffing within the maintenance area was adequate as indicated by the continued reduction of outstanding work requests. Similarly, the staffing required to support surveillance activities was adequate in that there have been no known

occurrences of surveillance test deferrals based solely on manpower constraints.

The effectiveness of training and qualifications for maintenance and surveillance personnel appears adequate. The licensee maintained a Craft and Technical Development Program for its maintenance staff which was INPO accredited in December 1985. This training included certification and development for all phases of maintenance personnel through the senior mechanic level. The licensee had also provided specialized training for selected maintenance personnel at various vendor facilities including Fairbanks Morris (EDG), Woodward Governors, Limatorque, and Westinghouse (rod drive control system and DB 50 breaker inspection and refurbishment). Onsite specialized training has also been provided to maintenance personnel for Chesterton die-formed graphite packing, live loading, and use of vibrational analysis and optical laser alignment equipment.

The violations listed below primarily involved procedural deficiencies and failure to follow procedures. These issues included the failure to have a program to control calibrated stop watches and the failure to implement an adequate surveillance procedure for the turbine redundant overspeed trip system as required by TS table 4.1-1. Coupled with the latter violation was a subsequent licensee non-conformance report (NCR 88-087) which identified several surveillance tests that exceeded the test frequency tolerance of +25% and four additional examples of Technical Specification related items without any applicable procedures. The four additional examples all involved event triggered surveillance activities. Available information indicated that these had never been required to be performed. At the conclusion of the assessment period, the subject NCR remained outstanding and it remained to be determined if these items represent a larger programmatic concern.

At the end of the assessment period, violation c. below was identified involving the failure of the licensee to promptly correct identified problems associated with the E&RC building sump pump controllers and the high level alarm system which led to the introduction of radioactive liquid into the storm drain system. The controllers, including the alarm and level probe, had not worked properly since their installation in 1985. Repairs to the system were completed in January 1988, and the automatic activation of the sump pump and alarm verified. Shortly thereafter, the licensee identified that the system was not functioning properly; however, no further work requests were initiated nor was the problem corrected until the release to the on-site storm drains was identified.

Overall, the number of violations attributable to the maintenance/surveillance area increased from the previous assessment period. Specifically, there have been two Level V violations and three Level IV violations identified during this assessment period compared to one Level IV and one Level V violation identified in the previous assessment period. The Level IV violation identified during the SSFI in the previous assessment period was not cited until this assessment period. Therefore, although listed as violation d. below, it has not been factored into the rating for this assessment period.

Six violations were cited, with violation d. being identified during the previous assessment period.

- a. Severity Level IV violation for failure to properly control work activities associated with reinstallation of pipe supports. (261/88-04-01)
- b. Severity Level IV violation for failure to establish a program to control or calibrate stop watches. (261/88-28-02)
- c. Severity Level IV violation for failure to identify and correct environmental and radiation control building sump pump controls. (261/88-28-09)
- d. Severity Level IV violation for failure to take prompt corrective action associated with vendor recommendations and water in oil samples involving the emergency diesel generators. (261/87-06-11)
- e. Severity Level V violation for failure to follow procedures relating to temporary repairs and trend analysis program deficiencies. (261/88-01-04)
- f. Severity Level V violation involving inadequate surveillance test procedure for the Turbine Redundant Overspeed Trip System. (261/88-10-02)

2. Performance Rating

Category: 2

3. Recommendations

The Board notes that although preventive maintenance has increased with a corresponding decrease in corrective maintenance, a large number of forced outages and the reactor trips were attributed, at least partially, to hardware failures.

Accordingly, the board strongly recommends that appropriate management attention and resources be applied to correct this situation.

D. Emergency Preparedness

1. Analysis

During the assessment period, inspections were performed by the NRC staff, including evaluation of a full scale exercise, a partial participation exercise, and a routine emergency preparedness inspection. Additionally, a routine announced inspection which included an onsite followup of operational events and appropriate event declarations, was conducted during the period of April 11, 1988, through May 10, 1988.

The full scale emergency exercise, performed on October 6, 1987, demonstrated that the licensee could implement the essential elements of emergency response. However, three exercise weaknesses were identified. Two weaknesses were in the area of public information. One was the failure to provide a timely news release following the declaration of a General Emergency (unexplained delay of 76 minutes). The other involved the failure to conduct a timely initial news briefing of State, County, and local support agencies following declaration of the General Emergency. A delay of approximately 67 minutes was observed regarding the initial news briefing. It should be noted, however, that the licensee demonstrated the capability to develop and disseminate accurate news releases, and to conduct effective joint news briefings with representatives of state, county, and local governments.

The third exercise weakness identified was inadequate administrative controls required to minimize radiological exposure to the environmental monitoring teams (EMTs) during a simulated casualty. A decision was made to simulate authorization for EMT personnel to take the thyroid blocking agent potassium iodide (KI). Accordingly, the EMTs were instructed to return to the plant dosimetry office and obtain the blocking agent with authorization forms. The return route taken by the EMTs to the plant involved an additional traversing of the plume, resulting in the unnecessary additional radiological exposure. An inventory of EMT kits disclosed that each kit contained two bottles of KI, revealing that the return of EMTs through the plume was not warranted.

The second emergency exercise, conducted with partial participation, was performed on August 2, 1988. No exercise weaknesses were identified. In view of the limited scope of the scenario for this exercise, corrective actions implemented in response to the exercise weaknesses identified during the 1987

full scale emergency exercise could not be verified. The subject weaknesses will be reviewed for resolution during future exercises.

The licensee's response to the simulated emergencies presented during the exercises demonstrated the capability to promptly identify and classify the postulated emergency events. However, the licensee's operations staff did demonstrate a weakness in identification and reporting of events requiring declaration of a Notification of Unusual Event (NOUE). This item is discussed in the paragraph below. The licensee's protective action recommendations made during the exercises were consistent with the Emergency Plan and implementing procedures, as well as EPA criteria. The exercises and routine emergency preparedness (EP) inspection disclosed that the licensee developed and implemented an effective dose assessment program. The licensee conducted detailed and effective exercise critiques that included substantive findings and recommended improvements. The licensee committed to take required corrective actions on all such findings.

On April 29, 1988, the plant operating staff demonstrated a weakness in the identification of emergency action levels (EALs) requiring declaration of a NOUE. The related violation, listed below, was issued for the failure to promptly identify the EAL and implement Plant Emergency Procedure PEP-101, which requires that a NOUE be declared when the identified reactor coolant system leak rate exceeds 10 GPM. Separate from this event, a second situation occurred which also involved a failure to properly follow the referenced Plant Emergency Procedure. This second event, which occurred on June 7, 1988, involved the explosion of a 55 gallon drum resulting from the reaction between residual amounts of hydrazine within the drum and the caustic solution transferred to it. The licensee's corrective actions for the first event also addressed this second event.

Notwithstanding the above identified EP program implementation weakness, a routine EP inspection performed on August 29 through September 2, 1988, disclosed that the licensee maintained a capability for prompt notification and effective communications with onsite and offsite support response organizations in the event of an emergency. Organization and management of the Emergency Preparedness program were reviewed and determined to be adequate. Review of an independent audit of the program, conducted by the licensee's Quality Assurance Department, disclosed that all findings identified were tracked for required response and closeout action. The routine inspection also disclosed that the licensee maintained a Tracking System Open Items List which documented all EP exercise, inspection, and

drill findings. Additionally, inspection of the emergency organization training program concluded that emergency preparedness training was adequate.

Review of the licensee's system for making changes to the Emergency Plan and Plant Emergency Procedures (PEPs) verified that licensee management approved all revisions to the Station Emergency Plan and PEPs during this assessment period. Controlled copies of the Station Emergency Plan and PEPs examined in the control room, TSC, and EOF were found to be updated and correct.

One violation was identified:

Severity Level V violation for failure to implement Emergency Plan Procedure PEP-101 which requires declaration of a NOUE following identification of a RCS leak rate in excess of 10 GPM. (261/88-07-01)

2. Performance Rating

Category: 2

3. Recommendations

None

E. Security

1. Analysis

During this assessment period, several physical security inspections and one inspection of material control and accountability activities were performed by the NRC staff. In addition, a Regulatory Effectiveness Review of the security program was conducted in December 1987.

The licensee has continued to demonstrate the ability to implement and manage an effective security program as evidenced by inspection results. The security organization was adequately staffed with knowledgeable and dedicated managers and supervisors who are capable of maximizing performance and productivity with available resources. The soundness of the licensee's established security program was reflected in the adequacy and current status of Physical Security and Training and Qualification Plans.

Security management continued to demonstrate awareness of, and participation in, security force activities. Both site and corporate security managers were responsive to security program needs and aggressively sought effective and lasting solutions to

security-related problems. Effective communications and managerial interface between the proprietary security management function and the contract security force further enhanced security program effectiveness. A well established and viable security training program, along with aggressive audit of performance and compliance requirements, contributed to the continuing effectiveness of the security program.

The Regulatory Effectiveness Review of the Robinson Security Program was conducted to determine if the security program, as implemented, provided the level of protection expressed in 10 CFR Part 73. No potential sabotage vulnerabilities were identified. However, several minor security issues were noted; some of which were beyond the scope of Security Plan and regulatory commitments. The licensee initiated actions as appropriate. In addition, four security program strengths were identified.

One Severity Level III violation, as described below, was identified during the assessment period, but was not indicative of a programmatic weakness.

The Material Control and Accountability inspection was conducted to determine whether the licensee had limited his possession and use of special nuclear material (SNM) to authorized locations and uses, and had implemented an adequate and effective program to account for and control all SNM in possession under license. The inspection determined that the licensee had developed and was maintaining an effective safeguards program for the control and use of both fuel and non-fuel SNM. External reporting was found to be accurate and timely.

One violation was identified.

Severity Level III violation (without civil penalty) involving an unauthorized, unsearched, unbadged person's entrance into the protected area (50-261/87-26-01).

2. Performance Rating

Category: 1

3. Recommendations

None

F. Engineering/Technical Support

1. Analysis

The Engineering Technical Support functional area addresses the adequacy of the technical and engineering support for all plant activities. To determine the adequacy of the support provided, specific attention was given to the identification and resolution of technical issues, responsiveness to NRC initiatives, enforcement history, staffing, effectiveness of training, and qualification. It includes all licensee activities associated with plant modifications, technical support provided for operations, maintenance, testing and surveillance, training, procurement, and configuration management. This evaluation was based on inspections conducted by the NRC staff in this area, as well as related functional areas.

In the previous assessment period, overall engineering support was identified to be weak. Inadequacies were in the areas of design analysis, modification control, engineering documentation, design basis utilization, and design verification. Plant management increased their involvement and control during this assessment period to improve the quality of engineering support. This management involvement was demonstrated by the scope of licensee initiatives involving the Design Basis Documentation (DBD) program, Microbiologically Induced Corrosion (MIC) service water investigation, and a Design Change Reduction program. The quality of engineering support has shown improvement as evidenced by engineering evaluation activity related to service water problems, SI pump small break loss of coolant accident (SBLOCA), EDG problems, and response to NRC Bulletins.

Licensee management identified the root cause of engineering weakness as a lack of understanding of system design basis, system functional requirements, system interfaces, and as-built system configurations. To resolve these basic weaknesses the licensee initiated the development of a comprehensive DBD program. This is a large scope program to acquire and integrate available safety system design basis documents in a common format. This program is scheduled for completion in 1991. Three pilot systems were scheduled for completion in 1988 and these were on-schedule at the close of this assessment period. Management policy for staffing this project was to minimize the use of contractor personnel, thereby maintaining knowledge and expertise at program completion and enhancing the licensee engineer's understanding of system design basis, interfaces, and functional requirements. The project team is directed by a project manager who reports to the corporate Nuclear Engineering

Department (NED) vice-president. This comprehensive licensee self-initiated program demonstrated the licensee's commitment to strengthen engineering support.

Other management initiatives included the development of a strong program to evaluate service water system problems related to MIC. The licensee's engineering activity has provided substantial input to the study of an industry wide concern with MIC. Management has contributed engineering resources to research this phenomenon and initiated a comprehensive surveillance program to monitor MIC impact on the service water system.

An additional management effort was the initiation of a Design Change Reduction program. This activity identified that inadequate premodification engineering walkdowns and inadequate design reviews were the major causes of excessive numbers of design change notices on modification implementations.

The overall technical capabilities of the site and corporate staffs were good, providing an improved quality of engineering activity over the previous assessment period. When necessary, the licensee engineering effort was effectively supplemented with contractor expertise, usually the Nuclear Steam System Supplier. The staff technical competency was demonstrated by various analyses performed during the review period. For example the engineering staff coordinated an extensive investigation and test program involving plant personnel, corporate personnel, vendors, and industry specialists to determine the root cause of EDG overspeed trip events which occurred in February 1988. Success of the effort has been demonstrated by no recurrence of overspeed trips during bi-weekly testing of the EDGs. Engineering evaluation of EDG cooler tube bundle failures identified a failure mechanism which led to action which improved EDG reliability.

Further examples of technical competency included engineering analysis to resume full power operation following the 60 per cent limitation imposed due to SBLOCA considerations related to SI pump single failure deficiencies. Additionally, engineering provided resolution to seismic support deficiencies for reactor protection racks and containment valve packing leakage problems. In response to IEB 79-02, Pipe Support Base Plates, and IEB 79-14, Seismic Analysis for As-built Safety Analysis Piping Systems, the licensee's resolution demonstrated a high level of safety consciousness.

During this assessment period, a technical inadequacy was identified in the analysis associated with implementation of Appendix K of 10 CFR Part 50. In 1974 the submitted model did

not adequately consider single failures when determining operability of Emergency Core Cooling System (ECCS) equipment for certain events. This resulted in the Severity Level III violation listed as a. below. It is noted that, although the licensee demonstrated improved engineering support during this assessment period, the engineering effort regarding the initial investigation into the above single failure deficiency was inadequate.

The licensee also received a civil penalty during this assessment period for EQ deficiencies identified in the previous assessment period; thus, this problem has not been factored into the rating for this assessment period. Subsequently, the licensee's EQ verification and DBD programs have identified deficiencies and weaknesses such as the questionable ability of service water to support containment cooling during design basis accidents, insufficient cable ampacity to carry emergency LOCA loads, and lack of environmental qualification of cable splices at containment fan cooler units. Benefits of the DBD program are also demonstrated by the program's contribution to resolution of concerns related to emergency electrical systems identified during the previous assessment period.

Engineering support for routine plant activities was limited due to the amount of reactive activities required of system engineers. The engineering staff consists of a small on-site group of licensee employees supplemented with contract employees and a corporate Nuclear Engineering Department (NED) located at the corporate office. The NED staff provided support on major design issues and plant modifications. The on-site staff utilized the system engineer concept which provides the advantage of engineers with up-to-date knowledge of system conditions and better trend identification potential for system problems. Although the quality of the system engineering staff was good, each system engineer had responsibility for a relatively large number of systems (6 to 8) which diluted the effectiveness of this concept. Additionally these engineers were the focal point for reactive issues and provided interface with NED. The amount of engineering support required by numerous issues (i.e., 7 reactor trips and 14 other forced outages) severely taxed the site engineering resources. This resulted in reduced system engineering oversight of routine operations, quality verifications, and proactive inspections. Accordingly, the licensee is considering expansion of the system engineering program.

The coordination between onsite and offsite engineering was good. These groups have worked effectively together to rapidly prepare plant modification packages on several emergent issues which required plant shutdown and correction prior to restart.

These included the B SI pump autostart feature, temporary instrumentation to monitor containment fan cooler performance, and temporary replacement of E2 to MCC-6 feeder cables. The coordination between the groups was also demonstrated by the preparation of Justifications for Continued Operation (JCO). The JCOs were expeditiously prepared, technically sound and generally well documented. Generally this engineering staff coordination of activities and modifications was good with some exceptions. For example, the onsite staff in its implementation of design change packages (DCP) M-912, Pressurizer Operated Relief Valve Block Valve Replacement, and M-920, Auxiliary Feedwater Control Wiring, failed to assure acceptance criteria in the DCPs were incorporated in the post-modification tests. This failure resulted in violation c. below. Other inadequacies (violations d. and e. below) were also cited during this assessment period but were identified during the previous assessment period. Accordingly, they have not been factored into the rating for this assessment period.

An adequate commercial grade dedication program for procurement items has not been developed at the site. The existing policy for commercial procurement permits the potential use of commercial "off-the-shelf" items in safety related applications without special quality verifications or a direct reasonable correlation between the item purchased and that originally tested. Engineering evaluations for original procured commercial grade items were adequate and were commonly referenced for further purchases of like items without critical characteristic verification for each usage. The lack of a commercial grade dedication or qualification program was an identified weakness in the procurement program.

Engineering response to 10 CFR Part 21 evaluations during the assessment period were found to be fully adequate. Review of general Q-List procurement and control of spare parts were also considered adequate with the previously discussed exception.

Training maintained an active involvement in the operations area as evidenced by the voluntary participation in the pilot operator requalifications program administered under the provisions of 10 CFR 55.59. This program represented the combined efforts of the licensee's training and operations departments and NRC, and was the first of these examinations administered in the country.

The training staff was adequate and effective in discharging their assigned responsibilities as evidenced by the pass/fail rate of 83% for operators initial and requalification examinations administered during this assessment period. Operator licensing replacement examinations were administered

during the weeks of August 11, 1987, and December 14, 1987, with the following results: 6 reactor operator replacement examinations were administered with 5 candidates passing; 4 senior reactor operator examinations were administered with three candidates passing. These results are comparable to the industry average for replacement examinations. The acceptability of the operating training program was demonstrated by the recertification by INPO in October 1988 of the non-licensed operator, RO, SRO, requalification, and STA training programs.

The licensee also initiated an operator degree program utilizing the University of Maryland's correspondence system which offers a Bachelors Degree in Nuclear Sciences. The program currently has a participation of approximately 75% of those eligible at H. B. Robinson.

Inspection of the requirements in Generic Letter No. 81-21, Natural Circulation Cooldown, concluded that appropriate training had been provided in the classroom and on the simulator for both SRO and RO programs. Overall conformity to the Westinghouse Emergency Procedure guidelines was observed, but some minor inconsistencies were noted, as well as the unavailability of a complete step deviation document for review.

The incorporation of a site specific simulator at H. B. Robinson was a strength to the operator training program, and proved to be a valuable asset. Although several minor weaknesses in the simulator capabilities were observed during NRC administered examinations, the training staff has continued to improve on these weaknesses.

The highly cooperative attitude of the training staff helped create a positive working environment for examination development and administration. Reference materials provided to the region continued to be presented in a well organized fashion and maintained current with plant conditions. This has been an asset to examiners in examination preparation.

Five violations were cited, with violations b., d., and e. being identified during the previous assessment period.

- a. Severity Level III violation involving the failure to comply with Appendix K relating to single failure of the SI system. (261/88-03-04)
- b. Severity Level III violation involving equipment qualifications. (261/87-10-01)
- c. Severity Level IV violation for failure to identify and perform adequate post-modification testing. (261/88-01-02)

- d. Severity Level IV violation involving inadequate battery load testing. (261/87-06-08)
- e. Severity Level IV violation involving inadequate emergency lighting. (261/87-06-06)

2. Performance Rating

Category: 2

3. Recommendations

The Board is encouraged by the initiative and efforts expended on the DBD program. Based on the large work load placed on the site engineering staff, the Board supports the licensee's efforts to increase the effectiveness of this group.

G. Safety Assessment/Quality Verification

1. Analysis

The NRC staff routinely reviewed engineering evaluations, Justifications for Continued Operation (JCOs), resolution of significant issues affecting system operability, and resolution of equipment problems. Several conference calls and meetings were held throughout the reporting period between the licensee, Region II and NRR to resolve NRC questions on various issues. In addition a Quality Verification Functional Inspection (QVFI) was performed.

Management was slow to recognize the full extent of problems and initiate corrective actions. However, once an issue was determined to be significant enough to require extensive corrective actions, the licensee demonstrated a strong commitment to safety by developing and implementing technically sound solutions and by shutting down the unit when the ability of major safety related equipment to perform their intended functions was in doubt.

One contributor to the slow response concerning design issues was the licensee's assumption that the plant was adequately designed and built; however, support of this assumption was not well documented. Excluding recent electrical issues, design related questions were typically successfully resolved and had only resulted from a lack of adequate documentation. Generally, the licensee did not have an aggressive approach to design type issues. The result was that some submittals to the NRC were more of a legal type document rather than an engineering document addressing the issue. This latter philosophy also contributed to a reluctance to adopt industry-wide practice or

present acceptable plans for equipment upgrade as exemplified by issues involving circuit breakers. In addition, the battery duty cycle and station electrical distribution voltages are two examples where submittals were incomplete and unacceptable, requiring repeated questions by the NRC before adequate analysis and information were provided.

Management occasionally failed to ensure a questioning, aggressive attitude toward problems. When combined with a tendency to initially consider items as isolated cases, this resulted in an initial lack of definition of the full scope of an issue and protracted resolutions. Examples of this included the diesel generator overspeed trip and reliability issue, the Cruise Hinds penetration to pigtail EQ splice issue and the submittal of supplemental responses to two violations to address the issues on a broader scope.

As a result of a series of electrical issues, the need for reconstituting the design basis of the plant was established. The licensee responded to this need by initiating the DBD effort. This emphasis on design basis also resulted in a shift toward acceptable technical resolution of outstanding issues at the end of the assessment period. This was exemplified during a series of meetings in October 1988. The licensee made commitments for improvements, either in equipment modification or in Technical Specification (TS) requirements, to address outstanding electrical issues. The licensee's timetable for resolving the electrical systems related concerns is acceptable to the NRC staff.

As indicated above, management showed a strong commitment to safety once an issue was clearly identified as requiring significant corrective actions. These actions were typically well planned and executed. For example, corrective actions associated with the SI single failure issue, EDG overspeed trips, and biological fouling of the containment fan coolers were very thoroughly researched and addressed prior to resumption of operation. Furthermore, management's commitment to safety was demonstrated when the licensee elected to shut down the reactor in three instances and delayed the startup in one other instance because of inadequacies identified through self-initiated engineering reviews. These instances were the inadequacy of the Service Water System to support post-accident containment cooling, EQ of the cable splices for the containment fan cooling system, EQ of the reactor vessel head vent valve-operators, and the inadequacy of cable ampacities to supply emergency power to the motor control center and various safety equipment. In every one of these instances, the licensee demonstrated initiative in safety concern identification and was thorough in engineering the corrective actions to assure

quality. The staff observed that all these cases of self-initiated safety concern identification and reactor shutdowns occurred during the later part of this assessment period, since May 1988.

The licensee's management involvement intensified, and the licensee became more responsive to the staff's questions throughout this assessment period. As a result, there was good progress in resolving a number of backlog issues. These activities were related to the emergency electrical system concerns identified in the SSFI, TMI Action Item reviews, requests for ISI and IST reliefs, Technical Specification amendments, exemptions from regulations, responses to generic letters and bulletins, and 10 CFR 50.59 evaluations.

The pace of resolving other licensing actions also accelerated during the latter part of this assessment period. Many of the multi-plant action items (e.g., 10 CFR 50.62, the ATWS Rule; GL 85-09, Reactor Trip Breaker Technical Specifications (TS); GL 88-06, Removal of Organization Charts from TS; Inadequate Core Cooling Instrumentation and Auxiliary Feedwater evaluation) were either completed or in the process for near-term resolution. However, for some issues, such as TS for reactor trip breakers and the inadequate core cooling instrumentation, the licensee was very slow responding to the staff's initiatives. This tardiness resulted in the licensee being one of the few who still has not resolved these multi-plant action items.

During this assessment period, five TS amendments and three exemptions were issued. The most significant amendments involved the SI system (i.e., the emergency TS change for operation at 60% power and the TS change to permit 100% power operation with two operable SI pumps). The licensee's safety analysis submittals for these cases were of high quality and thorough and the licensee was very responsive in expediting the staff's review. However, in general, the licensee's No Significant Hazards Considerations for the amendments were perfunctory, especially in the address of reduction in safety margin. The staff had discussions with the licensee's management regarding this weakness, and improvements were in evidence for the submittals toward the end of this rating period.

During a meeting with the licensee and a tour of the emergency response facilities, the licensee indicated that those TMI action items related to the upgrade of Emergency Response Facilities were completed and ready for inspection. The licensee was very responsive and thorough in providing the staff with information in this regard. Along with the accelerated pace of resolution of the other multi-plant action items, the licensee has made significant progress in reducing backlog issues.

The licensee has provided timely and thorough responses to all applicable generic letters (GL), NRC bulletins (NRCB), and 10 CFR Part 21 Notifications. The licensee performed a thorough engineering evaluation to show that the component cooling water system is not vulnerable to overpressurization and provided a satisfactory response to the Westinghouse Part 21 notification concern. During this assessment period, the staff reviewed the licensee's responses to GL 88-03 (steam binding of auxiliary feedwater pumps); GL 88-05 (boric acid corrosion of carbon steel reactor boundary components); NRCB 87-01 (thinning of pipe walls) and 88-01 (defects in Westinghouse circuit breakers). The staff found those responses to be timely, thorough, and acceptable for resolution. In general, the licensee has demonstrated high quality inputs; and active licensee management participation was evidenced in providing the staff with technically sound responses.

Based on the observation and review activity of the QVFI conducted during this assessment period, the licensee's QA program was adequately accomplishing its function of identifying, correcting, and preventing problems during this assessment period. Although the QA program has demonstrated strengths in several aspects, one deficiency was noted in the ability of the trending system to identify adverse trends. In response to an NRC question concerning frequency of surveillance testing problems within the recent past, the QA group discovered 16 NCRs had been issued between January 1, 1985, and June 14, 1988, which involved 23 surveillances being performed outside their Technical Specification frequency and five NCRs concerning certain Technical Specification requirements without applicable procedures. An NCR was promptly issued to address this potential programmatic issue.

The quality organization staff was of a size and experience level which permitted fulfillment of quality program objectives. The qualification and experience of the staff was technically adequate to provide for problem identification in the scope of quality program activities. A low turnover rate resulted in a continuity of inspection and audit expertise. Additionally, the relationship between the quality organization staff and plant staff was observed to be professional.

The scope and depth of quality organization audits and surveillances provided a generally adequate coverage of plant safety-related activity. QA audit depth was good, based on the relatively significant findings identified by QA audits this assessment period. Observation of quality organization surveillance activity indicated competence in the real time inspection function. A policy shift towards more surveillance and performance-based activity versus documentation compliance

reviews noted in the previous SALP report has continued through this assessment period. Notable examples were; observed activity surveillances, several "vertical slice" modification audits, and auxiliary feedwater safety system functional inspection (SSFI). This shift is a positive reflection on response to NRC initiatives towards performance-based and "vertical slice" inspection techniques.

The plant broad based corrective action program (nonconformance reporting system) was reviewed for effectiveness in identifying and resolving problems. Identified deficiencies were satisfactorily resolved. Management emphasis on usage of the deficiency reporting system resulted in a large increase in identified deficiencies by plant personnel without an increase in the backlog of processed deficiency reports. These aspects of the corrective action program indicated an effective deficiency reporting process. The management initiative to promote reporting of deficiencies by all plant personnel was commendable.

In the previous assessment period, the NRC determined that the documentation quality of Licensee Event Reports (LERs) required improvement. Specific areas to be improved were discussions of Safety System responses and identification of failed components. In response to this issue, the licensee developed and implemented a LER quality improvement program. In June 1988, a LER writer's guide entitled "LER Handbook" was completed and implemented. At the end of the assessment period, the documentation of discussion of safety system responses and identification of failed components were generally good. Supplementary reports were issued as necessary when additional information became available after the initial report was issued. The reports were issued in a timely manner. However, the final processing of the reports, including Plant Nuclear Safety Committee (PNSC) review, was typically completed within the last three days of the 30 day period, and, in some cases on the last day. Although this has not affected the technical accuracy of the LERs, it has resulted in one NRC approved extension beyond the 30 day period (LER 88-006). There were 36 LERs submitted during the assessment period. Five LERs were classified as significant. They involved EDG inoperability due to overspeed trips, reactor protection and control instrument rack not being properly anchored, potential for failure of RHR due to design inadequacy in miniflow, inability of SI and RHR to be timely shifted to recirculation mode, and single failure scenarios for SI autostart.

JCOs in all cases were technically sound and generally well documented. In one instance, the NRC identified that a formal engineering evaluation had not been documented to support continued operation. This issue involved a possible compromise

of containment integrity due to MIC attack on service water piping inside containment. The issue had been previously reviewed by plant management for safety significance, but the need to formally document the technical basis for their decisions had not been identified.

PNSC meetings adequately addressed safety issues at the plant. Meetings typically consisted of technically sound discussions with active involvement by participants from all disciplines. This active participation was considered a major strength. On occasion, presentations by some individuals indicated a lack of thorough preparation. Although this impacted the efficiency of the process, it did not adversely affect the adequacy of the decision making process.

No violations or deviations were identified.

2. Performance Rating

Category: 2

3. Recommendations

The Board acknowledges that the licensee has conservatively shut down the unit when there were indications that safety systems might be inoperable. However, there is a concern over the observed slowness to develop the full scope of emergent issues.

V. SUPPORTING DATA

A. Investigation Review

None

B. Escalated Enforcement Action

1. Civil Penalties

Severity Level III violation issued on September 18, 1987, involving the mispositioning of valves which resulted in the isolation of Low Pressure Safety Injection. (\$50,000 CP)

Severity Level III violation issued on November 13, 1987, for failure to adequately implement 10 CFR 50, Appendix R requirements. (\$50,000 CP)

Severity Level III violation issued on June 15, 1988, involving the failure to comply with Appendix K relating to single failure of the SI system. (\$50,000 CP)

Severity Level III violation issued on June 16, 1988, involving equipment qualification. (\$450,000 CP)

2. Orders

None

C. Management Conferences

August 21, 1987	Enforcement Conference at Region II to discuss a failure to maintain access control to the protected area.
September 17, 1987	Enforcement Conference at Region II to discuss environmental qualification of electrical equipment.
October 13, 1987	Management Meeting at the Robinson Visitor's Center to discuss the 1987 SALP Board Assessment.
March 1, 1988	Management Meeting at Region II to discuss communications between CP&L and NRC relating to the safety system functional inspection and its followup inspection.
March 30, 1988	Enforcement Conference at Region II to discuss a design basis problem involving safety injection pump availability.
April 5, 1988	Management Meeting at Region II to discuss the scope and status of the reconstitution of the Robinson design bases.
June 7, 1988	Management Meeting at Region II to discuss identified problems at the three CP&L sites and to reveal plans and established goals to achieve overall excellence.
September 20, 1988	Management Meeting at Region II to discuss the status of the Robinson Design Basis Reconstitution program.

D. Confirmation of Action Letters

One Confirmation of Action Letter, dated February 11, 1988, concerning the failure of Robinson's electrical distribution system to meet single failure criteria with respect to the Safety Injection System.

E. Review of Licensee Event Reports (LERs)

During the assessment period, 36 LERs for the unit were analyzed. The distribution of these events by cause, as determined by the NRC staff, was as follows:

<u>Cause</u>	<u>Number</u>
Component Failure	13
Design	13
Construction, Fabrication, or Installation	2
Personnel:	
- Operating Activity	5
- Maintenance Activity	3
- Test/Calibration Activity	0
- Other	0
- Out of Calibration	0
<hr/> Total	<hr/> 36

F. Licensing Activities

In support of licensing activities, meetings were frequently held with the licensee to discuss licensing status and resolution of technical issues. Significant licensing issues that were assessed during this assessment period included: Regulatory Guide 1.97, Revision II; ATWS Rule 10 CFR 50.62; NUREG-0737 III.A.1.2, Emergency Response Facility, and III.A.2.2, Meteorological Data Upgrade; NUREG-0737 II.E.1.2, Automatic Bus Transfer of Auxiliary Feedwater System; NUREG-0737 II.K.3.5, Auto Trip of Reactor Coolant Pumps; GL 88-03, Steam Binding of Auxiliary Feedwater Pumps; GL 88-05, Boric Acid Corrosion of Reactor Pressure Boundary Components; Bulletin 88-01, Defects in Westinghouse Circuit Breakers; and 87-01, Thinning of Pipe Walls.

Six (6) amendments were issued during this assessment period including an emergency TS change which limited the plant operation to 60% of the rated power level when two Safety Injection (SI) pumps were operable. Other significant amendments were: Organization of the Plant Nuclear Safety Committee, 100% Power Operation with Two Operable SI Pumps, Number of Incore Flux Thimbles, and Radiation Monitor at Steam Generator Blowdown Header.

There were three (3) exemptions during this assessment period. They involved: Appendix R, Section III.J, Emergency Lighting; 10 CFR 20.103(c)(2), Physical Examination for Users of Respiratory Equipment; and 10 CFR 50.54(w)(5)(i), Scheduling Requirements of Property Insurance Rule. The licensee was also granted an interim relief from certain inservice testing requirements related to the

Containment Spray and Component Cooling Water Systems pending the submittal of a revised testing plan.

In addition to the regularly scheduled licensing status meetings between the project manager and the licensee's licensing staff, beginning February 1988, there were a number of other meetings on specific licensing issues. They involved: Safety Injection and Single Failures (2/10, 2/12); Emergency TS Change, Safety Injection (2/16); 100% power TS (5/05); Emergency Response Facilities (7/14); RTD Bypass (7/27); and Emergency Electrical Systems (10/20, 10/21).

G. Enforcement Activity

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	Dev.	V	IV	III	II	I
Plant Operations	0	0	2	2 ⁽¹⁾	0	0
Radiological Controls	0	1	2	0	0	0
Maintenance/Surveillance	0	2	4	0	0	0
Emergency Preparedness	0	1	0	0	0	0
Security	0	0	0	1 ⁽²⁾	0	0
Engineering/Technical						
Support	0	0	3	2 ⁽³⁾	0	0
Safety Assessment/Quality Verification	0	0	0	0	0	0
TOTAL	0	4	11	5	0	0

Footnotes:

- (1) SL III violation involving isolation of LPSI (\$50,000 CP)
SL III violation involving Appendix R issues (\$50,000 CP)
- (2) SL III violation involving access control to the protected area (No CP)
- (3) SL III violation involving ECCS evaluation model (\$50,000 CP)
SL III violation involving EQ issues (\$450,000 CP)

H. Reactor Trips

A total of seven automatic reactor trips occurred during the assessment period, six above 15% power and one below 15% power. No manual trips were initiated. Also no trips occurred with the unit subcritical. During the previous assessment period, eight trips

occurred above 15% power, two occurred below 15% power and five occurred with the unit subcritical. The trips are described in more detail below:

July 10, 1987 - The A main feedwater regulating valve failed closed, due to an electrical short in the DC wiring on the valve operator. This resulted in a steam/feed flow mismatch coincident with low steam generator A level which caused a reactor trip from 100% power.

July 16, 1987 - The A main feedwater regulating valve failed to control properly due to a faulty valve positioner. This resulted in a steam/feed flow mismatch coincident with low steam generator A level which caused a reactor trip from 72% power.

August 10, 1987 - A replaced intermediate range detector (N-35) which had an improper setpoint due to a procedural deficiency caused a reactor trip from approximately 8% power.

September 28, 1987 - During the performance of a surveillance test of the reactor protection logic trains A and B a personnel error resulted in both trains being placed in the test mode causing a reactor trip from 100% power.

January 19, 1988 - The unit tripped from 66% power due to a turbine trip. An excessive leaking autostop oil relief valve when combined with surveillance testing resulted in a low autostop oil pressure turbine trip.

May 2, 1988 - A component failure in the turbine E-H control system resulted in all four turbine governor valves closing causing a turbine trip/reactor trip from 60% power.

May 12, 1988 - During the performance of a surveillance test on the TROTS system a component failure resulted in satisfying the 2/3 logic and a turbine trip/reactor trip from 60% power.

I. Effluent Release Summary

<u>Activity Released (curies)</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
1. Gaseous Effluents			
a. Fission and Activation Gases	2.14E+3	6.59E+2	7.70E+2
b. Iodine and Particulates	1.37E-2	9.92E-3	2.08E-2
2. Liquid Effluents			
a. Mixed Fission and Activation Products	9.41E-2	1.81E-1	7.36E-1
b. Tritium	3.09+2	3.42E+2	2.74E+2