ENCLOSURE

SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE
INSPECTION
REPORT NUMBER

50-338/86-22 and 50-339/86-22

Virginia Electric and Power Company

North Anna Plant Units 1 and 2

March 1, 1985 through August 31, 1986

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

An NRC SALP Board, composed of the staff members listed below, met on November 5, 1986, to review the collection of performance observations and data to assess licensee performance in accordance with guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." A summary of the guidance and evaluation criteria is provided in Section II of this report.

This report is the SALP Board's assessment of the licensee's safety performance at North Anna for the period March 1, 1985 through August 31, 1986.

SALP Board for North Anna:

R. D. Walker, Director, Division of Reactor Projects (DRP), RII (Chairman)
V. W. Panciera, Deputy Director, Division of Reactor Safety, RII
J. P. Stohr, Director, Division of Radiation Safety and Safeguards, RII
V. L. Brownlee, Chief, Reactor Projects Branch 3, DPR, RII
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J. L. Caldwell, Senior Resident Inspector, North Anna, DRP, RII
L. B. Engle, Project Manager, PWR Licensing Division-A, NRR

Attendees at SALP Board Meeting:

A. J. Ignatonis, Chief, Reactor Projects Section 3B, DPR, RII
K. D. Landis, Chief, Technical Support Staff (TSS), DPR, RII
R. P. Croteau, Project Engineer, Reactor Projects Seciton 3B, DPR, RII
C. J. Paulk, Reactor Engineer, TSS, DRP, RII
T. C. MacArthur, Radiation Specialist, TSS, DRP, RII

II. CRITERIA

Licensee performance is assessed in selected functional areas depending on whether the facility has been in the construction, preoperational, or operating phase during the SALP review period. Each functional area represents an area which is normally significant to nuclear safety and the environment and which is a normal programmatic area. Some functional areas

may not be assessed because of little or no licensee activity or lack of meaningful NRC observations. Special areas may be added to highlight significant observations.

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

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

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

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

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

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

The functional area being evaluated may have some attributes that would place the evaluation in Category 1, and others that would place it in either Category 2 or 3. The final rating for each functional area is a composite of the attributes tempered with the judgement of NRC management as to the significance of individual items.

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

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

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

III. SUMMARY OF RESULTS

A. Overall Facility Performance

The North Anna nuclear power station is staffed and operated by knowledgeable and qualified personnel, especially first line management. The corporate senior management involvement to improve quality and plant performance was evident by the licensee's use of such programs as the Nuclear Performance Monitoring where 34 performance indicators are trended on a monthly basis, implementation of Quality Maintenance Teams for improving maintenance activities, responsiveness to NRC initiatives, and maintaining good communications with the NRC. Acceptable performance at the plant level was also observed. The licensee's evaluation and resolution of technical issues was thorough and technically sound. Some examples include licensee's prompt correction of a problems associated with the main steam safety valves, root cause evaluation and implemented corrective actions to the problem associated with the emergency diesel generators, and a high quality submittal of the Appendix R Reanalysis Effort and Exemption Requests. Strengths were identified in the functional areas of fire protection and licensing activities.

During the SALP period the North Anna facility had high availability and unit capacity factors, fewer than the industry average safety system actuations and safety system failures, and a reactor trip rate that was comparable to the 1985 industry wide average (6 trips per unit per year). However, for the performance indicator of inadvertent automatic reactor trips, the licensee exceeded their own set goal of having no more than two automatic reactor trips per unit per year. For the 1986 time frame (January through August 1986), Unit 1 had six automatic reactor trips and Unit 2 had five. The licensee recognizes this and is working with the Westinghouse Owners Group to reduce the number of reactor trips. In the maintenance area, the NRC has noted that the corrective maintenance items backlog was not being efficiently reduced. The licensee is cognizant of this and is trending the backlog. Also, frequent identified reactor coolant system leakages were experienced. In order to minimize these events, more aggressive and effective corrective actions need to be pursued. The licensed operator training program may need to be strengthened because the requalification program was found to be marginally acceptable based on the examination results.

In conclusion, the licensee is implementing new and innovative techniques to improve quality and performance in various disciplines of plant operations including the information received from international

agreement programs. Also, the licensee is working with INPO to complete their training programs accreditation.

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

Functional Area	Previous SALP Dates	Current SALP Dates
	September 1, 1983 February 28, 1985	March 1, 1985 August 31, 1986
Plant Operations	2	2
Radiological Controls	1	2
Maintenance	2	2
Surveillance	2	2
Fire Protection	2	1
Emergency Preparedness	2	2
Security	1	2
Refueling/Outages	1	2
Training	2	2
Quality Programs and Administrative Controls Affecting Quality	2	2
Licensing Activities	2	1

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

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

The North Anna facility is staffed with a knowledgeable and professional management organization especially first line management. Their involvement in the day to day activities of the plant is evident by the detailed instructions provided to the operations staff and their presence in the control room during the hours on site. One good example of management support and involvement is the Check Operator program which was initiated in May of 1986. This program involves choosing one of the more experienced operators whose function will be to observe day to day control room operations involving normal, abnormal and emergency operations and events. The check operators will assess operator actions and equipment operation and report their findings and recommendations directly to the Assistant Station Manager for Operations and Maintenance. The operator chosen to perform this

function is very enthusiastic and dedicated to the program and appears to be very well received by the operations staff. Also, the Vice President of Nuclear Operations was observed to be aware, when necessary, of current plant matters and plant management decisions, and is involved when necessary. He visits the facility periodically to observe and discuss plant activities and is visible to the plant's staff.

The VEPCO staff continues to provide the operations department with adequate support as evidenced by continued cooperation with the French and Japanese Nuclear Organizations and they are presently working on an agreement with the Swiss Nuclear Organization. This cooperation involves trips to the various sites such as a recent trip to Japan by Virginia Electric and Power Company (VEPCO) engineers and technicians to review and assess the good aspects of the Japanese operation. It also involves having these organizations review VEPCO programs and make recommendations regarding improvements.

The introduction of the corporate Nuclear Operations Department monthly report entitled "Nuclear Performance Monitoring - Management Information Report" has provided trending information for management personnel in 34 different areas. Some of the areas are; Forced Outage Rate, Reactor Trips, Safety System Events, Personnel Radiation Exposure, Control Room Annunciators, Temporary Modifications, Quality Assurance Findings, etc. This monthly trending report is a valuable tool for management in assessing performance and identifying problem areas. Along with the report, the corporate staff, with input from the sites, has developed a Nuclear Operations Department Standards Manual providing the policies and standards by which both North Anna and Surry will operate. This manual will provide a consistent mode of operation between the two sites and will allow the corporate office to evaluate the comparison of the performance indicators between the two sites.

The plant operations staff response to reactor trips and other operational events has generally been very good. Following a reactor trip and prior to plant restart the licensee conducts a review of the operational event which includes human performance evaluation to determine human error causes.

During the assessment period, North Anna Units 1 and 2 experienced a total of nine and seven reactor trips, respectively. This converts to a reactor trip rate of 0.78 per 1000 critical hours (or 6 per year) for Unit 1 and 0.61 per 1000 critical hours (or 4.7 per year) for Unit 2. The 1985 industry wide average was 6.0 trips per year and the average rate of 1.04 per 1000 critical hours (6.8 per year) for Westinghouse plants. For the 1986 time frame only (January through August 1986), Unit 1 experienced six automatic reactor trips and Unit 2 had five. The licensee has

established a goal of having no more than two automatic reactor trips per unit per year. Thus based on the 1986 data, this goal was not met.

Out of the nine reactor trips for Unit 1, three trips were manual and six trips were automatic. The review of the reports submitted by the licensee indicates that two of the nine reactor trips were caused by personnel error and seven reactor trips were caused by equipment failures. Of the seven Unit 2 reactor trips, one was a manual trip and the remaining were automatic trips. One reactor trip was caused by personnel error and the others were caused by equipment failure. The reactor trips are described in Section V.J. of this report.

Based on the above data, the licensee's performance in the area of reactor trips is comparable to the industry average when examined over the SALP period. For the 1986 time frame, the number of North Anna facility reactor trips exceeded the licensee's expectation and their set goal of having no more than two automatic reactor trips per unit per year. In fact, the number of reactor trips was considerably greater than that at the Surry facility. The licensee is cognizant of their performance in this area and is participating with the Westinghouse Owners Group for reduction of reactor trips.

Additional plant operational statistics observed during this SALP period are presented below:

Operational Parameters	Unit 1	Unit 2
Unit Availability Factor (%)	79	86
Unit Capacity Factor - Design Electrical Rating (DER) (%)	74	77
Forced Outage Rate (%)	9.8	7.2

The North Anna Units 1 and 2 availability factor, the Unit Capacity Factor-DER, and the Forced Outage Rate compare favorably with the industry averages for 1985 which are 68.5%, 61.7%, and 11.3%, respectively. Thus, all of these indicators reflect an index of merit which is better than the industry average. Also, when evaluating the performance indicator of forced outage rate averaged over four quarters with the last one ending the second quarter of 1986, both North Anna units performed above the industry average.

Plant operations have been interrupted on sixteen occasions due to Technical Specifications required shutdowns. Most of these shutdowns involved greater than the Technical Specification limit leak rates inside Containment or Emergency Diesel Generator (EDG) failures. The licensee has experienced EDG degradation and EDG failures at the North Anna facility in 1985 and early 1986. These

problems were of a significant concern that resulted in management meetings with the licensee to discuss their engineering evaluations for the root cause determination and proposed corrective actions. The EDG engine failure mechanism was piston wrist pin bushing elongation primarily due to EDG piston overload and inadequate lubrication. The corrective actions included reduction of fast, cold starts and loadings, engine oil (lube oil) changeout, and increased surveillance. The oil was changed in March 1986 followed by a 120 hour demonstration run of the EDG; no evidence of any significant bushing elongation was observed after the end of the EDG run. The root cause was adequately identified and no further problems have been encountered to date.

The operational information provided by the licensee in Licensee Event Report (LER) Submittal was brief and accurate. An evaluation of the content and quality of a representative sample of LER's was performed by the NRC using a refinement of the basic methodologies presented in NUREG/CR-4178, March 1985. The results show that the North Anna LERs have an overall average score of 8.1 out of a possible 10 points, compared to a current industry average of 7.9. The principle weaknesses identified, in terms of safety significance, involve the requirement to provide an assessment of the safety consequence of the event and the requirement to identify failed componets in the text. One strong point identified by the report are the well written discussions concerning the failure mode, mechanism and effect of failed components.

Early in the assessment period some 10 CFR 50.72 immediate notifications were not telephoned to the NRC within the required limits. This was discussed with licensee management as documented in inspection report 50-338/85-18 and 50-338/85-18. The problem was one of interpretation and licensee management did agree to use the NRC interpretation. Immediate Notifications, together with their updates, did not always agree well with the event descriptions in the Monthly Reports and sometimes components were not identified in sufficient detail to tell if the same components were failing in similar reported events. On two occasions, Immediate Notification of forced rampdown to 0% power did not appear in the Monthly Report. However, both the Immediate Notifications and LERs indicate the licensee took appropriate action with regard to reportable events.

Control room decorum continues to be very well maintained. Access to the control room during the periods of shift turnover is restricted to operations personnel only. At all other times personnel other than operations personnel must get permission from the Senior Reactor Operator (SRO) to enter the designated controlled area. Licensed Operators wear distinctive clothing to aid in distinguishing their function in the control room. The

Shift Supervisor's office is presently in the Technical Support Center (TSC) where he screens and processes all paper work associated with the maintenance, surveillance and operation of the plant. This minimizes the number of non-operational personnel in the control room and gives the shift supervisor good knowledge and control over activities which could affect plant operation. Shift clerks are assigned to each shift to help the Shift Supervisor, Assistant Shift Supervisor and Reactor Operators with administrative tasks.

Early in the assessment period plant housekeeping and cleanliness was average. However, the licensee has started an aggressive new program to upgrade the overall plant appearance. This program involves extensive painting and labeling in the plant. Along with the painting, the licensee will be providing uniforms for all the plant staff. The main goal of the program is to establish a feeling of pride and professionalism among the staff.

Staffing in the operations department is adequate. The licensee's goal to have six shift coverage has been delayed until sometime in 1987 due to the most recent licensed operator exam results.

Although the violations listed below did not indicate a programmatic weakness and covered several areas of responsibility, they generally reflect personnel failures to follow procedures. Four violations and one deviation were identified during the assessment period.

a. Severity Level IV violation with two examples; one for failure to have an adequate procedure to ensure design criteria for the auxiliary feedwater pump was not exceeded and the other for failure to follow procedures and provide mechanical danger tags as required. (85-26-01) Unit 1 only.

b. Severity Level IV violation for failure to follow procedure and perform a required safety evaluation. (86-17-03) Unit 1 only.

c. Severity Level V violation with 2 examples for failure to follow a valve lineup procedure and failure to follow a danger tagging procedure. (85-03-05)

d. Severity Level V violation with examples for failure to follow procedures (85-16-02).

e. Deviation for failure to properly use to governor valve limiter as a load limiter.

2. Conclusion

Category: 2

Trend During This Period: Improving

3. Board Recommendation

The frequent (approximately 8 occurrences that required shutdown) high leakage rate problem is an issue which must be aggressively pursued by the licensee management. Also, the licensee needs to be more attentive to following procedures. Emergency Diesel Generator problems were of a significant concern in the earlier part of the assessment period; however, after extensive evaluation by the licensee the root cause was identified and the problem appears to be resolved. No change in the level of NRC staff resources applied to the routine inspection program is recommended.

B. Radiological Controls

1. Analysis

During the assessment period, inspections of radiological controls and chemistry were performed by the resident and regional based inspectors, including a confirmatory measurement inspection using the Region II mobile laboratory.

The licensee's health physics (HP) staffing level was adequate to support routine operations. During refueling outages, extensive use was made of contract HP technicians to supplement the permanent staff. Efforts were underway to increase the size of the onsite technician staff, and to add additional persons to the technical staff in order to reduce their reliance on contractor personnel.

Personnel exposure during the evaluation period was approximately 380 man-rem per reactor in 1985 which was below the average (425 man-rem per reactor) for U. S. pressurized water reactors (PWRs). Through March 1986, 415 man-rem (208 man-rem/reactor) had been expended against a projected total for the year of 458 man-rem. Due to an unplanned outage, the man-rem estimate for the year was revised to 790 man-rem, 760 of which have been expended.

Management support and involvement in matters related to the radiation protection program were not always sufficient to ensure implementation of a strong program for maintaining the occupational dose as low as reasonably achievable (ALARA). This was exemplified by poor attendance at ALARA Committee Meetings by members from crafts which routinely account for a large proportion of the station's exposure. This was brought to the licensee's management attention during a January 1986 inspection. The licensee had dedicated only one individual to the station ALARA program, and as a result, minimal time was available for prejob planning and postjob reviews for the 1985 and 1986 refueling outages. Examination of postjobs reviews for jobs exceeding original dose estimates by 25 percent showed them to be cursory in that they lacked information which would permit future avoidance of encountered problems. The collective dose for the outage was approximately 600 man-rem. Although the licensee exceeded the collective dose estimates for

the fall refueling outage which lasted 48 days, by approximately 100%, at the time of the last inspection (No. 86-07) the licensee had not identified the reasons for the overage.

One strength noted in the health/physics program was the stability of the health physics technician staff. The low attrition rate has resulted in a more experienced group of individuals and has provided the time necessary to implement an effective and continuing training program for the technicians. Audits performed by the corporate health physics staff and by the quality assurance group for the radiation protection program were adequate in scope and depth to identify problems in the areas reviewed. Timely corrective actions were taken and documented.

During 1985, the licensee had completed development of a formal training and qualification program for radiation protection technicians. The program was submitted to the Institute of Nuclear Power Operations for accreditation, which was achieved in June 1986.

Implementation of the radiation protection program by the licensee was, in general, adequate in the area of radiological evaluations. However, one violation was issued for failure to evaluate the beta radiation levels present in the steam generators prior to personnel entry during the 1986 refueling outage. A second violation in the area of radiological evaluation was made with dose rates on the external surface of the package in excess of regulatory limits. This resulted in a Severity Level III violation. In both instances, judgmental error and lack of attention to detail by first line HP supervision contributed to the violation.

The respiratory protection appeared adequate in that no violations were identified during the assessment period. During the assessment period, no overexposures, either internal or external, were identified. In general, internal exposures were low.

The licensee's approach to resolution of radiological technical issues has generally been adequate.

In the area of radiological confirmatory measurements, during participation in the NRC's spiked sample program in 1985, disagreement in measurements for two nuclides was observed while in 1986, no discrepancies were noted. The licensee demonstrated agreement with the Region II mobile laboratory measurements except for a discrepancy in calibration for the particulate filter geometry which led, in part, to a violation issued during the assessment period.

The licensee submitted the required effluent and environmental reports during the evaluation period. The total quantity of radioactivity in the licensee's gaseous releases were less than

the average releases reported by 14 Region II plants of similar size and type for 1985, but the liquid releases were greater than average. Both liquid and gaseous effluents were within regulatory limits for quantities of radioactive material released and for dose to the maximally exposed individual. For 1985 releases, the maximum calculated total body dose to a member of the public was 1.26 mrem from liquid releases and 1.37 mrad from gaseous effluents. These calculated doses represented 5.0 percent and 5.5 percent of the 40 CFR 190 whole body limit of 25 mrem/year. Although there were several small unplanned releases of radioactive material in gaseous and liquid effluents, there were no unplanned gaseous or liquid releases above limits required to be reported to the NRC during the evaluation period. No adverse impact due to the plants' operation was detected by the radiological environmental monitoring program. The total quantity of radioactivity in gaseous and liquid releases is tabulated in Section V.K. of this report.

During the assessment period, it was noted that an improvement in chemistry control was being achieved through reduction of inleakage, improvement of the condensate cleanup system, and implementation of the Steam Generator Owners Group guidelines. Additional plans called for further upgrading of the design of the secondary water cycle, replacement of copper-alloy feedwater heater tubes, and improvement of the blowdown recovery system. A comprehensive online analytical monitoring system is being installed as part of a new steam generator protection program in conjunction with Westinghouse. Management involvement in improvement of chemistry controls was evident.

During the assessment period, the licensee tracked the square footage of the plant that was maintained as contaminated. On January 1, 1985, approximately 20,675 square feet of the plant was maintained as contaminated whereas as by January 1, 1986, this area had decreased to 16,687 square feet or six to seven percent of the Auxiliary Building. As of September 1, 1986, total contamination areas were approximately 15,000 feet.

During 1985, the licensee made 61 shipments of radioactive waste consisting of 23,423 cubic feet (11,711 cubic feet per reactor) of waste containing 290 curies of activity. This amount was approximately the same as the national average for PWRs of 11,650 cubic feet per reactor.

Three violations were identified.

a. Severity Level III violation for failure to maintain dose rates on the external surfaces of transport packages below regulatory limits. (86-07)

b. Severity Level IV violation for the failure to evaluate the beta radiation levels in steam generators "A" and "C" prior to initiating maintenance activities. (86-07)

c. Severity Level V violation for failure to maintain adequate procedures to ensure accurate radiological surveys. (85-25)

2. Conclusion

Category: 2

3. Board Recommendations

A return to the routine inspection program is recommended.

C. Maintenance

1. Analysis

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

Despite the identification of a concern involving a large backlog of outstanding maintenance items in the last assessment period the present backlog, as of August 31, 1986 is 5,257 open maintenance work orders which is still very large. The maintenance work order backlog breaks down to the following: 1461 items are described by the licensee as programmatic; 1,533 items have been reported to be complete but the paperwork has not been reviewed to verify completion; 1,318 items can be worked during any mode of operation; and 945 items require unit shutdown before they can be worked. This backlog is indicative of a problem in the area of completing identified maintenance work items; however, it also indicates a good program in the area of equipment problem identification. The practice of identifying equipment problems should continue but the licensee's performance in closing out identified maintenance items shows a need for improvement. The licensee has taken action to reduce this backlog by hiring additional contractors to aid in closing out some of the items. This action caused a reduction in the total number of outstanding maintenance work orders but at present no significant reduction in safety-related maintenance work orders was observed. The continued existence of a large number of outstanding maintenance work orders and the need to hire additional contractors indicates that resources devoted to the performance of maintenance items may not be sufficient. A weakness in this area was exhibited by the examples given below.

The failure to promptly execute certain outstanding work orders have contributed to operational difficulties such as the failure of an Emergency Diesel Generator due to a lube oil line rupture.

The area where the rupture occurred had been previously identified as having a leak a month earlier and was tagged with a maintenance work order. Another example occurred on May 29, 1986 when Vital Bus 1-I was transferred to its alternate source of power which is a sola transformer. This transformer is not an uninterruptable source of power. The transfer was performed because the normal supply battery charger exhibited ampere fluctuations. Even though the alternate supply of power is acceptable, the preferred source of power is the battery charger and inverter because it has the station battery as a backup. No work was performed on the battery charger and three days later on May 31, 1986, the sola transformer failed, de-energizing the Vital Bus 1-I, and resulting in a reactor trip.

Both units have experienced a large number (8) of Technical Specification shutdowns due to the leakage inside of containment exceeding the Technical Specification limits. The leaks were in valves of the reactor coolant system, the charging system, and in the Unit 1 reactor vessel head "O" ring. Another specific example was of a leak identified on valve 2-RC-6 which required unit shutdown on April 18, 1986. The leak was stopped using Furmanite; however, leakage from valve 2-RC-6 again resulted in a shutdown on July 25, 1986, when again the leak was repaired with the use of Furmanite. The repetitiveness of reactor coolant system leaks, even though they are of relatively low magnitude, is indicative of inadequate or ineffective corrective action.

Review of the selected performance indicators (PIs) such as safety system failures, forced outage rate, and equipment forced outages per 1000 critical hours shows that the performance of both North Anna units was above average in performance when compared to the industry mean. In one case, the Unit 1 PI for equipment forced outages per 1000 critical hours showed it to be at the industry mean. The data was analyzed over four calendar quarters with the last one ending the second quarter of 1986. However, when comparing the PI of equipment forced outages per 1000 critical hours against the plant's performance over four quarters, a declining trend was noted. In conclusion, the PIs reflect acceptable maintenance practice at the North Anna facility when it is compared to the industry.

Management involvement in maintenance programs is evident by the observation of the licensees implementation of such programs as the use of MOVATS equipment, Chesterton valve packing, Visual Information Management System, and incentive maintenance agreements with contractors where incentives are proposed for exceptional work and reduced pay for poor work. Also, the licensee continued to evaluate new approaches to improving the quality of maintenance. One new approach was the initiation of the "Quality Maintenance Teams" concept in 1985. This concept establishes a highly trained team of maintenance personnel who are

given special training in the areas of preplanning, and electrical maintenance, mechanical maintenance, quality assurance, and health physics. They then are assigned jobs which they accomplish as a team. The mission of the team is to perform all work assigned in a high quality manner without the involvement of additional support staff in the areas of health physics coverage and quality control inspections. The development of the quality team concept includes a formal training program which provides instruction in the fundamentals of the team approach, problem solving techniques, quality control training and inspector certification and advanced radiation worker training. Quality Maintenance Team members received high visibility and several team members recently participated in an information exchange visit to nuclear plants in Japan.

Maintenance activities undertaken were observed to be well organized and planned by the planning department. Maintenance work schedules demonstrated evidence of prior planning and the assignment of priorities by management, however, these priorities were subject to change as evidenced by a backlog of priority one and two safety related work orders. Problems were identified in the areas of work reviews, maintenance of work records and performance of acceptance tests. These problems were especially evident in the performance of design change packages which resulted in Violations a., b., and numerous inspector comments about discrepancies in completed and reviewed design change packages for Station Battery replacement. Violations c. and d. are examples of poor quality assurance and inadequate reviews of completed maintenance procedures. Violation d. was identified by the NRC as a repeat violation from the previous assessment period indicating that the licensee's previous corrective action was not sufficient to prevent reoccurrence. Also, portions of violations a. and c. addressed in the functional area of Plant Operations involved problems in the maintenance area where licensee personnel failed to follow procedures.

The computer tracking system is beginning to be used more effectively. At the request of the inspector, the licensee developed a means of listing only the outstanding safety related maintenance work orders. The licensee is also modifying procedures to require the superintendents of the other disciplines to have a better understanding of how the system works and become more involved with the decision making process for determining which items are worked. In the near future the licensee plans to institute a procedure requiring the superintendents and the Assistant Station Manager for Maintenance and Operations to meet twice a month to review the outstanding work and maintain a list and schedule of all items to be worked in the event of an unplanned outage. The licensee is also working towards setting up the system so that when a major component becomes available for

maintenance, the computer can be used to generate a list of all maintenance items related to that component.

The operations staff (e.g. licensed operators) are performing system walk downs so that priorities can be properly set on the present list of outstanding maintenance work orders in an attempt to ensure that the important maintenance receives top priority.

The operation staff has designated an SRO as the Operations Maintenance Coordinator. One of the coordinator duties is to track and ensure that the number of alarmed annunciators in the control room is reduced to the absolute minimum. Even though the number is smaller than the last assessment period, it still remains significant.

Four maintenance violations were identified during the assessment period.

a. Severity Level IV violation for failure to provide an adequate design change procedure resulting in the improper installation of a safety related piece of equipment (85-36).

b. Severity Level IV violation for failure to follow a design change procedure for determining corrected specific gravities for the station batteries (86-13).

c. Severity Level V violation for failure to follow procedure and sign for work completed in a Mechanical Maintenance Procedure (85-11).

d. Severity Level V violation for an inadequate review of procedures for Reactor Trip Breaker Maintenance (85-11).

2. Conclusion

Category: 2

Trend During This Period: Declining

3. Board Recommendations

Licensee management attention should be devoted to not only to reducing the total number of work orders but also expediting priority items. Also, the licensee management needs to increase emphasis on the correction of valve leakage. Greater management attention is needed to determine root cause and adequate correction of equipment malfunction. On the positive side, the Board was pleased to note licensee's implementation of new

techniques to improve performance and an innovative approach in using Quality Maintenance Teams.

No change in the level of NRC staff resources applied to the routine inspection program is recommended.

D. Surveillance

1. Analysis

During the evaluation period, inspections were performed by the resident and regional inspection staffs. Several strengths and weaknesses were observed in the surveillance area. The strengths included the successful power upgrade, core performance and startup test areas, staff additions, the resolution of the main steam safety valve problem, and the snubber surveillance program. Weaknesses observed included surveillance tracking, poor handwritten procedures, inconsistencies in procedures, and discrepancies between the Technical Specifications (TSs) and the Final Safety Analysis Report.

Reactor core performance and startup testing areas were inspected by the regional staff. Surveillance procedures used prior to, during and following initial, post-refueling, criticality to confirm proper operation of systems disturbed during refueling or to confirm core design parameters were generally of the technical quality and detail for data collection and analysis usually encountered in Region II facilities.

The procedure developed to measure the moderator temperature coefficient at power is superior to those in use at other facilities. However, its implementation in one case was poor. The test results did not meet expectations, and the test was judged to be a failure. The cause of the test failure was not fully determined or evaluated. Further, a retest was not rescheduled within a reasonable period of time to justify continued operation. This issue is currently being reviewed.

Improvement in the areas of staffing and training indicate management involvement in the control and quality of the surveillance program. The addition of an Inservice Inspection (ISI) staff consisting of a supervisor and several engineers and technicians is an example of the increased staffing. An item of concern in the previous evaluation period was the experience and knowledge level of personnel in the surveillance and test section. The number of personnel in this section has increased by three, two of which had previous experience. The experience level has increased by the additional time on the job since the last evaluation period. To enhance the surveillance and test section's knowledge of plant systems, industry codes and standards and TS requirements, the licensee has developed a training program

consisting of 17 different training modules. As of August 31, 1986, half of the surveillance test group had completed 12 of the 17 modules.

Plant management was responsive when a Main Steam Code Safety Valve (MSRVs) setpoint drift problem was encountered. The setpoint drift problem was identified by the licensee during surveillance testing, corporate management responded by contracting an independent test lab to repair and reset the MSRVs. In addition, corporate personnel were sent to the lab to witness maintenance and testing on the valves. The licensee's decision making is at a level that assures adequate management review and corporate management is usually involved in site activities. A review of the documentation associated with the MSRVs indicated the records were complete, well maintained, and available. In conclusion, the licensee's resolution to this issue was timely, viable, and sound.

An inspection by the staff of the licensee's snubber surveillance program identified no violations. Management involvement and control in assuring quality was evident based on the results of the overall review of the North Anna Power Station Snubber Surveillance program. A previous review was conducted in April-May 1984 when problems (which resulted in a Civil Penalty) were identified by NRC with the Surry Power Station Snubber program. The inspection during this assessment period identified that previous deficiencies in the North Anna program identified during the previous review were corrected through issuance of a new procedure. The corrective action to resolve the deficiencies was timely, sound and thorough, and acceptable to NRC. Records of snubber surveillance activities were complete, legible, well maintained and easily retrievable. Staffing and training of snubber surveillance personnel was adequate.

The direct responsibility for ensuring that TS surveillances are performed correctly and within the required time frames has been delegated to the supervisor in charge of the section responsible for performing the surveillance. The surveillance and test group still tracks the performance of surveillances to ensure that they are performed with the required time frame but the direct responsibility now rests on the specific supervisor. Since the supervisor of the section performing a surveillance has direct control over when a surveillance is completed, this change should help alleviate problems related to exceeding TS surveillance frequency requirements.

The licensee's approach to the resolution of technical issues from a safety standpoint was demonstrated recently by the successful performance of a power upgrade in Unit 2. Surveillance calibration procedures were changed to reflect the new 100% power level. The licensee conducted instrument calibration using these

procedure changes to adjust the set points for the control and protection instruments. These calibrations were conducted with the unit operating at power and allowed the increase in core thermal power to the new 100% level without shutting the unit down. This operation was completed without any problems or transients occurring. Also during this evaluation period the licensee developed and issued a TS surveillance cross reference procedure designating which plant surveillance procedure accomplishes the specific TS surveillance requirement. This cross reference procedure not only helps in determining which specific licensee procedure is associated with which TS surveillance requirement but it also serves as a check to ensure that all TS surveillance requirements are being addressed.

In the previous evaluation period the licensee demonstrated a weakness in the area of implementation of new TS surveillance requirements generated from approved TS amendments. To alleviate this problem the licensee utilizes a Computer Tracking System (CTS) to monitor the progress of changes to surveillance requirements generated by TS amendments. The system seems to be working to date and its effectiveness will be determined through additional time. The inspector has noted, however, that the licensee does not always place emphasis on preparing procedural changes in advance which would ensure that surveillance procedures were ready and properly conducted once the TS amendment is approved. The licensee also utilizes the computer system to keep track of surveillance performance. The computer system is limited to only having positive control over surveillances which have a month or greater time interval requirement. Surveillances which have to be performed on a schedule of less than a month are tracked manually. There have been problems associated with this manual tracking method, as demonstrated by violation d., where the seven day plus 25% grace period TS requirement was exceeded due to a scheduling error. Also if not properly utilized the computer system will not ensure that surveillance test frequencies are met as demonstrated by violation e.

The inspectors identified a concern associated with hard to read hand written procedure changes. These changes were issued for use until the final typed written ones were available. The backlog of procedures awaiting final typing was excessive and the quality and condition of the hand written procedures was very poor. Violation c. was directly attributable to a hard to understand hand written procedure change. This situation has been discussed with the licensee on several occasions and documented in inspection reports 338,339/85-18, 338/85-22 and 338,339/85-31. The backlog of procedure changes awaiting final typing has not been reduced substantially; however, the licensee has taken the position that only acceptable hand written changes will be approved for use.

The inspectors identified concerns relating to inconsistencies in surveillance procedures especially in the area of safety related batteries and hydrogen recombiners. These inconsistencies consisted of differences between the same procedure for different units, differences in the procedures and TS requirements, failure to have acceptance criteria or perform an evaluation on recorded data and difference in vendor specifications and surveillance procedures. These inspections resulted in violation a. in this functional area and violation b. in the maintenance section, both related to safety related battery testing.

The inspectors also identified a few cases where discrepancies existed with the TS and Final Safety Analysis Report (FSAR) requirements. The first example involved a TS requirement to inspect the cell plates of the diesel fire pump battery. These batteries are in solid black cases and cell plate inspection is impossible. The licensee has submitted a TS change to correct this discrepancy. The second example deals with the TS requirement to perform a surveillance on the hydrogen recombiners. The performance of this surveillance requires manual containment isolation valves to be open which would cause a violation of the TS requirements for containment integrity if this surveillance is performed with the unit in modes 1, 2, 3 or 4. The last example deals with a FSAR requirement for instrumentation calibration accuracy to be within +/- 0.5% for verifying and setting the overpower setpoint. The inspectors discovered that the alternate feedwater temperature instrumentation had a calibration accuracy of +/- 3%. This feedwater temperature instrumentation was to be utilized for the calorimetric calibration only if the computer feedwater temperature instrument input is lost. The licensee has not had to use the alternate feedwater temperature instruments and has taken action to ensure that they will not be used.

Another area the regional staff specifically reviewed was the measuring and test equipment (M&TE) program. The M&TE program met regulatory requirements except that environmental conditions had not been established in the electrical and physical work shop. Violation f. was issued for this discrepancy.

Finally violations a., b., and f. are examples of failure to follow procedures and vendor recommendations.

Six violations were identified during the assessment period.

a. Severity level IV violation for failure to properly conduct surveillance requirements of TS on the station batteries. (85-12-04) (Unit 2 only)

b. Severity level IV violation for failure to follow procedure for testing the emergency diesel generator. (86-04-01) (Unit 2 only)

c. Severity Level IV violation for failure to comply with Technical Specification Limiting Condition for Operation Action Statement of RVLIS operability. (85-22-01) (Unit 1 only)

d. Severity level V violation for failure to perform surveillance requirement in the allotted time interval. (85-18-02)

e. Severity level V violation for failure to comply with TS surveillance frequency. (85-19-01) (Unit 1 only)

f. Severity level V violation for failure to establish proper environmental controls for the calibration of Maintenance and Test Equipment (M&TE). (85-19-02)

2. Conclusion

Category: 2

3. Board Recommendations

Licensee management attention and involvement are evident and are concerned with nuclear safety; licensee resources are adequate and are reasonably effective. NRC attention should be maintained at normal levels.

No change in the level of NRC staff resources applied to the routine inspection program is recommended.

E. Fire Protection

1. Analysis

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

The Region's Appendix R inspection of North Anna, conducted in September 1985, reviewed VEPCO's revised Appendix R safe shutdown and related fire protection reanalyses, commitments which were sent to the NRC May 1, 1984 and March 8, 1985, and the Appendix R related plant modifications. The Region's inspection identified several unresolved items which are being reviewed by the NRC. These items, along with VEPCO's revised Appendix R analysis, are currently under review by the NCR Staff (NRR). Upon completion of this review and issuance of a Safety Evaluation Report, Region II will conduct another inspection to verify compliance with the NRC requirements.

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

The staff inspections reviewed the licensee's implementation of the fire protection program and administrative controls. General housekeeping and control of combustible and flammable materials were satisfactory. The fire protection extinguishing systems, detection systems and fire barriers and fire barrier penetrations were found to be in service with one exception. A number of cable penetrations through fire barriers were found which did not conform to the FSAR and tested design in that the "cerafiber" or "cerablanket" damming materials had been removed from the penetrations. This was identified as a deviation. Otherwise, the surveillance inspection and tests and maintenance of the fire protection systems and features were satisfactory.

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

The management involvement and control in assuring quality in the fire protection program is evident due to the involvement in the site fire protection program and the issuance and implementation of fire protection procedures that meet the NRC requirements and guidelines. The licensee's approach to resolution of technical fire protection issues indicates an understanding of issues, and is sound and timely. The responsiveness to NRC initiatives are technically sound and thorough in most cases. Fire protection related violations are rare. However, when violations do occur, effective corrective action is promptly taken. Licensee identified fire protection related events or discrepancies are properly analyzed, promptly reported and effective corrective action is taken.

Staffing for the fire protection program is adequate to accomplish the goals of the position within normal work hours and only occasional overtime or backlog of work. Fire protection staff positions are identified and authorities and responsibilities are clearly defined. Personnel are qualified for their assigned duties. The fire brigade training program is adequately defined and implemented. The number of trained fire brigade members is adequate to meet the minimum of five brigade members per shift as required by the Technical Specifications.

The following deviation was identified:

Deviation involved with several conduit fire stop penetration seals through fire barriers not installed in conformance with the approved tested configuration. (85-24)

2. Conclusion

Category: 1

3. Board Recommendations

Licensee management attention and involvement are aggressive and orientated toward nuclear safety.

The board recommends that NRC staff resources applied to the routine inspection program be reduced.

F. Emergency Preparedness

1. Analysis

During the assessment period, inspections were performed by the resident and regional inspection staffs. The inspections included two routine emergency planning inspections, one reactive inspection assessing the licensee's classification of a Notification of Unusual Event, and observation of one full participation and one partial participation emergency exercise.

The routine inspections and exercises showed that the licensee had the capability to detect and classify emergencies, notify appropriate offsite agencies, assess plant conditions and project offsite consequences, and make appropriate protective action recommendations. Although no violations were identified during this assessment period, the licensee's demonstration of its ability to adequately implement the emergency plan and procedures during the 1986 annual emergency exercise showed the need for improvements. The 1986 emergency exercise did not meet all objectives. The exercise did not demonstrate the ability to evacuate non-essential personnel from the site and the ability to make a full transition to the recovery mode. However, exercise players demonstrated knowledge of applicable procedures in these two areas. In addition, the licensee noted that, because of a misunderstanding, the offsite rescue squad did not participate in the exercise. The licensee committed to run a medical drill promptly to demonstrate this capability. During the 1986 exercise, NRC inspectors observed that the licensee did not demonstrate a clear assignment of responsibility for communicating protective action recommendations to offsite agencies. Although the Emergency Plan specifies that this is a nondelegatable responsibility of the Emergency Manager, the Recovery Manager assumed this responsibility during the exercise. In addition, NRC inspectors observed that field monitoring data was not fully

considered in the development of protective action recommendations. This did not result in inappropriate recommendations during the exercise, but indicated a need to assure such consideration was included in the future.

The licensee has conducted a thorough critique as indicated by identification of additional 23 findings for followup as part of their exercise observation and critique program. The licensee committed to take action on these findings.

No violations or deviations were identified during the assessment period.

2. Conclusions

Category: 2

3. Board Recommendations

No change in the level of NRC staff resources applied to the routine inspection program is recommended.

G. Security and Safeguards

1. Analysis

During this evaluation period, routine inspections were performed by the resident and regional inspection staffs.

Corporate and site management have continued to support the security program; however, since the last SALP rating period, the North Anna Power Station has been cited for two Severity Level III and one Severity level IV violations for physical security related events. One Severity Level III violation resulted from allowing an authorized individual to enter the protected area without being challenged, identified, searched, or badged. A second Severity Level III violation was caused by the licensee's failure to control a path from the owner controlled area to the protected area. The Severity Level IV violation resulted from the licensee's failure to notify the Nuclear Regulatory Commission of changes to the protected area perimeter, within the required 60 day time period.

While the identified violations reflected deficiencies in the area of access control and administrative oversight, the licensee has continued efforts to eliminate security personnel errors, provide improved procedures, and renovate access portal hardware. During the most recent security inspection the licensee's enforcement of access controls received extensive review and resulted in no violations being identified.

The licensee's security program as established and maintained has conformed with commitments contained in approved physical security, contingency and training and qualification plans with the exception of the areas noted.

Inspector observations and findings indicated that the licensee's approach to technical issues related to physical security program commitments were sound, conservative and thorough in most cases. However, errors in performance and lack of adherence to requirements by responsible employees detracted from levels of performance previously noted.

The licensee has a well established and aggressive hands on performance training program rather than a written examination type program. The violations noted below were not indicative of the total effectiveness and proficiency of the security program at North Anna.

The violations identified were as follows:

a. Severity Level III for failures to control access to the protected area. (86-08) Civil Penalty of $25,000 issued.

b. Severity Level III for failure to control a path from an owner controlled area to the protected area. (85-20) No civil penalty was issued.

c. Severity Level IV for failure to report changes of the Physical Security Plan to the NRC. (85-13)

2. Conclusion

Category: 2

3. Board Recommendations

No change in the level of NRC staff resources applied to the routine inspection program is recommended.

H. Outages

1. Analysis

During the evaluation period inspections were performed by the resident and regional inspection staffs. Refueling operations were observed for Unit 1 during November and December 1985 and for Unit 2 during February and March 1986. The inspectors observed reload from the control room, refueling floor, and the spent fuel pool area.

Refueling activities reflected thorough preplanning. The refueling staff and staff training were adequate. Technical problems encountered during refueling were promptly resolved in a competent and safety conscious manner.

Unit 1

Unit 1 experienced several problems in starting up following the refueling outage.

A shutdown was required on December 24, 1985 due to 'B' loop Delta T greater than 6% from 'A' loop with the 'C' loop Delta T already in the trip position. The problem existed as a result of a disconnect of the valve disc from the stem in the Rockwell Edwards valves located in the bypass loop. The licensee examination showed that fourteen of fifteen valves experienced stem separation. This problem was identified in the NRC issued Information Notice (IEN) 84-48. This indicates that the licensee had not appropriately followed up on this IEN.

The reactor was shutdown on December 29, 1985, when the unidentified leakage exceeded 1 gpm. The problem was identified as Conoseal leakage which was then repaired and the plant heated up. During heatup the leakage still exceeded 1 gpm and the plant was cooled down, the reactor vessel (RV) head was removed and the RV head "O" ring was replaced. Also, during the period of December 23-29, 1985, repairs were made to correct several other leaking components. The repairs included the application of Furmanite to some of the reactor coolant system valves.

Unit 2

A complete overhaul of the 2H and 2J emergency diesel generators (EDGs) was accomplished with a licensee commitment to take wrist pin bushing gap measurements every 6 months or 40 hours of operation. This surveillance commitment, together with the replacement of engine oil, were a part of the corrective actions taken to preclude excessive bushing elongation resulting in EDG failure. These actions were implemented in late March 1986, and to date no problems have recurred.

The licensee and Westinghouse personnel were interviewed while performing the fuel handling evolution to ensure that personnel were properly trained and following approved procedures. Westinghouse was contracted to do the fuel replacements. The people interviewed were experienced and had performed these evolutions in the past. The inspectors verified that adequate housekeeping, radiological and accountability controls were established and implemented. The inspectors visited the Westinghouse trailers and observed

the ISI testing of a reactor vessel nozzle and the eddy current testing of the "C" steam generator. Procedures were in place for all activities.

Unit 2 experienced several valve leaks on the reactor coolant system and the charging system in April 1986. Furmanite was required to repair both the 'B' and 'C' main feedwater regulating valves. Leaks were also encountered on the 'B' reactor coolant loop cold leg loop bypass valve RC-45, the drain header from the 'B' loop RC-69, and the sample line off of 'B' loop RC-68. Most of these valves were repaired by the use of Furmanite.

The Unit 2 post refueling startup test performance records were adequate. The reload analysis results predicted a positive moderator temperature coefficient (MTC) for beginning of cycle and unrodded core conditions.

A review of open safety related work requests for both units indicated that several priority 1 and 2 work requests identified as mode 5 which predated the outage had not been completed after the outage. It appears that in order to expedite the outage some of the identified maintenance deficiencies were omitted. This later showed up in component leaks and facility down time. A high reliance is placed on Furmanite application.

Facility maintenance work during unit outages was routinely inspected by the NRC staff. This work effort included modification of spent fuel racks, hydrolasing of service water pipe, assembly of large diameter service water piping, and letdown filter isolation valve replacement. Within these areas the inspector determined that the activities were adequately planned, performed and reviewed in a safe and controlled manner. Documentation was concise and retrievable. Quality control involvement in these activities was adequate. The licensee's resolution of technical issues was acceptable.

The licensee's inservice inspections of safety related components and associated piping were inspected by the NRC. This work effort was primarily an audit of the inservice inspection (ISI) program, review of records, and evaluations of inspection results. The program was consistent with regulatory requirements and documentation was concise, accurate and retrievable. Quality control involvement was adequate.

No violations were observed in this period.

2. Conclusion

Category: 2

3. Board Recommendations

Licensee resources were adequate in this area. No change in the level of NRC staff resources applied to the routine inspection program is recommended.

I. Quality Programs and Administrative Controls Affecting Quality

1. Analysis

During this evaluation period, routine inspections were performed by the resident and regional inspection staffs. The regional staff specifically reviewed the offsite support staff, offsite review committee, QA Program, and licensee actions on previously identified inspection findings.

For the purpose of this assessment, this area is defined as the ability of the licensee to identify and correct their own problems. As such it encompasses all plant activities, all plant personnel, as well as those corporate functions and personnel that provide resources to the plant. The plant and a corporate QA staff is a part of the entity, and as such, is mainly responsible for verifying quality. Thus, the rating in this area specifically denotes the results for various groups in achieving quality as well as the QA staff in verifying that quality is achieved.

A review was performed on all sections of this SALP report in an attempt to capture apparent strengths and weaknesses related to management controls affecting quality. The following are some perceived strengths in management controls affecting quality:

An innovative approach in using Quality Maintenance Teams to improve maintenance activities.

Management involvement in the maintenance area where new programs such as Chesterton valve packing, Visual Information Management System, and maintenance agreement with contractors have been introduced to improve performance.

Nuclear performance monitoring where 34 performance indicators are trended on a monthly basis.

Use of the operator check program where one of the best operators is selected to observe day to day control room operations.

Additional staffing and training of personnel dealing with the surveillance program. This illustrates a priority within management to correct a potential problem with surveillance activities.

Prompt correction of a problem associated with the Main Steam Code Safety valves. This problem was identified during an

surveillance test. The licensee hired personnel to address this item and seek corrective action.

Licensee's handling of a number of licensing issues in a professional and competent manner.

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

Frequent, identified reactor coolant system leakages indicating inadequate or ineffective corrective action in the maintenance area.

Continued problems with personnel failing to follow procedures.

Continued problems with a large backlog of outstanding maintenance issues.

Problems with the performance of design change packages.

Repeat violations relative to inadequate procedure reviews for reactor trip breaker maintenance.

Concerns related to the surveillance area.

Not taking adequate corrective action relating to an IE Information Notice 84-48 relating to Rockwell Edwards valves.

Offsite support staff activities appeared to be well controlled in that various staff members understood their responsibilities and authorities. Corporate staff members frequently visit the site to augment their support function. Corporate staff groups exhibited close working relationships which resulted in coordinated support to the site.

The Independent and Operating Event Review Group (IOER) is undergoing changes since a new manager was appointed in early 1986. Some changes include new evaluation depths on certain areas, streamlining reviews and information dissemination. VEPCO has also formed a Nuclear Overview Committee (NOC) which is made up of upper level management which reviews IOER activities.

Licensee QA program controls were adequate and the licensee was in the process of revising their program from Revision 4 to Revision 5.

During a routine regional inspection in the area of modification to the service water intake structure, four examples of a violation of licensee requirements were identified - Failure to control temperature of concrete test cylinders, failure to control

moisture content of select fill, failure to meet specified test requirements for slump, air, concrete temperature and aggregates, and document correct quantities of concrete mix ingredients on batch tickets, and failure to have a procedure which implements current specifications. This led to severity level III violation identified as violation a. below.

Four violations occurred during this reporting period.

a. Severity Level III violation for multiple failures to met requirements during modification to the service water intake structure.

b. Severity Level III violation involving numerous quality assurance records falsified without apparent management knowledge. (This violation is entered for record purposes only in that it occurred in a previous SALP period but was issued during this SALP period).

c. Severity Level IV violation for failure to maintain the necessary quality records to verify qualification of personnel.

d. Severity Level IV violation for failure to require a review of Design Change Acceptance Tests for Technical Specification requirements.

2. Conclusion

Category: 2

3. Board Recommendations

No change in the level of NRC resources applied to the routine inspection program is recommended.

J. Training and Qualification Effectiveness

1. Analysis

In this evaluation period the regional staff assessed the licensee's training program in different disciplines of the licensee's organization during the routine inspections performed in the functional areas addressed in this SALP report. Training of personnel was looked into in such areas as plant operations, maintenance, quality assurance, health physics, emergency preparedness, fire brigade, and security. No particular deficiencies were identified in the areas reviewed. In the maintenance area, Quality Maintenance Team members received specialized training in the areas of preplanning, electrical and mechanical maintenance, quality assurance, and health physics. In

the physical security area, the licensee has a well established and aggressive training program for their personnel. The fire brigade program was adequate.

The licensee has been participating with INPO (Institute of Nuclear Power Operations) to establish new programs for plant performance improvement. In particular these include the INPO Accreditation Program and the Human Performance Evaluation System (HPES) wherein all plant events caused by human error are investigated using guidelines and methodologies established by INPO and the results transmitted to INPO for use in an HPES data base. INPO has accredited the licensee's licensed operator and non-licensed operator training programs, the radiation protection training program, and the electrical and mechanical technician training programs. INPO is scheduled to review the instrumentation and control, shift technical advisor, and engineer training programs in 1987.

The check operator training program was instituted during this SALP period. This program is designed to use experienced and well qualified licensed operators to evaluate performance of new operators that are being trained on the simulator and assigned on shift in the control room.

Three sets of replacement operator licensing examinations were administered and one requalification examination was administrated during the SALP rating period. Two of two senior reactor operator (SRO) candidates passed the written examination administered in April 1985. The operating and written examinations administered in October 1985 and June 1986 resulted in five of ten SRO candidates and eleven of twelve reactor operator (RO) candidates passing. The requalification examination administered in December 1985 resulted in two of five SRO candidates and four of four RO candidates passing. The requalification program was deemed marginally acceptable based on the examination results.

The replacement examination passing rate of 75% and was consistent with the industry average.

2. Conclusion

Category: 2

3. Board Recommendations

No change in the level of NRC resources applied to the routine inspection program is recommended.

K. Licensing Activities

1. Analysis

The licensee has demonstrated a high level of management involvement in assuring quality in licensing activities. The licensee's management has demonstrated active participation in licensing activities and has kept abreast of current and anticipated licensing actions. Particularly noteworthy has been the management involvement and initiative in the following areas: (1) the completed licensing activities associated with the North Anna Units 1 and 2 amended license for the receipt and storage of 500 Surry spent fuel assemblies; (2) the completed license activities for the uprate in the core power level from 2775 MWt to 2893 MWt; (3) forceful effort in pursuing the North Anna Units 1 and 2 Service Water Piping and Valve Corrosion and Preservation Program; (4) attention and response to recent emergency diesel generator problems; (5) the Appendix R Reanalysis Effort and associated plant modifications and exemption requests, and (6) the licensee's proposed Integrated Implementation Schedule.

The licensee's management actively pursues an aggressive and continuous upgrade in the North Anna Units 1 and 2 Technical Specification (TS) for continuity and similarity. This effort is substantiated by the number of TS changes submitted on a continuing basis by the licensee. It is noted that the licensee's management has actively supported licensing issues and resolution which represented analyses or methodology which have been first of a kind. A case in point was the licensee's amendment request for extending the Limiting Condition of Operation (LCO) from 72 hours to 168 hours for which one redundant service water header can be inoperable. Probabilistic and failure mode analyses were presented by the licensee which represented a new approach to the NRR staff for solving this type of issue. Another example was the licensee's presentation to NRR management on April 17, 1986 regarding excessive reactor trip breaker testing and presentation of a revised maintenance schedule.

The licensee's management has actively initiated and pursued an aggressive policy of Quality Control on proposed amendment changes to assure that the final submittal to NRR represents a quality product. During the last half of this SALP reporting period a significant improvement has been noted in the licensee's submittals.

During the previous SALP reporting period, it was indicated that the licensee's management had reacted to a proposed "material false statement" by a two fold increase in the time required for sign-off of any NRC submittals. In addition, licensee management changes had resulted in some confusion and loss of continuity regarding the integral status of NRC actions for the facility. These problems have been corrected and it can be stated that the licensee's management appears to have now significantly "fine tuned" the control and quality of NRR submittals.

The licensee's Nuclear Programs and Licensing Organization has been increased by at least a factor of two since the last SALP reporting period. This increase in staffing has taken place both at the licensee's corporate office as well as the facility. Both at the supervisory level and at the working level this increase in staff has resulting in an enhanced ability to assess, evaluate and prepare licensing responses to NRR. In addition, operations qualified personnel are integrated into the corporate levels of management to provide guidance in licensing matters which involve operations. Finally, the level of expertise of the licensee's augmented staff (nuclear, engineering, operations, etc.) has increased the licensee's ability to provide in a timely manner, high quality submittals for NRR evaluations.

With regard to the licensee's approach to resolution of technical issues from a safety standpoint the licensee understands the issues involved. Whenever technical issues are addressed in depth, knowledgeable people are involved who can address an issue not only from the licensee's standpoint but also from a knowledge of NRC regulations, criteria and generic issues. Interface with the NRR staff at meetings and site visits is open, professional, candid and responsive to staff needs.

The licensee accepts its responsibility for plant safety and operability and assesses, evaluates and implements technical modifications when required and does not necessarily wait for NRC requirements. A recent example of this responsibility is the licensee's submittal to the NRC (extending the LCO from 72 hours to 168 hours) regarding the corrosion and mechanical cleaning of the service water system piping and valve repairs. As presented, the licensee's program represents a unique approach to upgrading the service water system.

On occasions, when the licensee deviated from staff guidance, the licensee has consistently provided good technical justification for such deviations. The fire protection program is a good example illustrating the soundness of the technical justification for deviations and exemptions from the guidance. When unusual events have occurred at the facility, the licensee had used conservative approaches in dealing with the situations and performed in-depth analyses of significant safety issues raised by such events. During the recent and ongoing resolution of emergency diesel generator failures, the licensee has contracted an engineering consultant as an independent third party to monitor and critique the licensee and vendor effort for improving maintenance, operating procedures and root cause(s) for previous component failures. This is not the first time that the licensee has made use of an independent third party to monitor licensee and vendor endeavors.

The licensee has made frequent visits to NRC to discuss forthcoming requests for staff actions prior to formal submittals. Examples of such visits are licensee-staff meetings regarding the North Anna Units 1 and 2 Power Upgrade, the issue of the facility site visits, the licensee is most cooperative and provides the technical staff necessary to discuss appropriate matters.

The licensee's quality of responses has been excellent. The licensee's submittals for Power Uprate, the Appendix R Reanalysis Effort and Exemption Requests, and the Service Water System Piping Cleanup Program are a few examples of excellent quality content.

The licensee, after NRC identification, has significantly improved the quality of the no significant hazards evaluations for TS amendment requests. The quality of these submittals has alleviated, in part, a large work load for NRR in noticing the licensee's many TS changes for North Anna 1 and 2.

The licensee's management and staff maintains excellent liaison with the NRR project manager. It is common practice for the licensee to expeditiously report to the project manager any event reported to the NRC emergency response center. Also, the licensee notifies the project manager well in advance of forthcoming requests for amendments or review of safety issues.

As noted in the previous SALP report, the licensee's response for meeting commitment dates had significantly deteriorated because of problems noted above. These problems have been corrected. Moreover, the licensee has initiated a tracking system for licensing issues which uses in part input from the NRC Regulatory Information Tracking System. This effort has resulted in an enhanced capability to assign priorities to licensing actions and maintain schedules and provide applications to NRR on a more selective and orderly month by month basis. This effort on the part of the licensee has alleviated some of the past NRR workload in processing the licensee's many applications.

However, in the area of Inservice Inspection and Testing, the licensee's submittals for requesting relief have in the past been provided to NRR on a "last minute" basis indicating poor control and scheduling. This matter has been discussed with the licensee and marked improvement has been noted in the last third of the subject SALP reporting period.

2. Conclusion

Category: 1

3. Board Recommendations

None.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Unit 1 began the assessment period at approximately 100% power. On August 3, 1985 the Unit was shutdown for inspection and repair of tube leakage in Steam Generator 1A. Thirteen tubes were plugged and the unit restarted on August 18, 1985. On September 11, 1985 the unit was again taken off line until September 17, 1985 to correct reactor coolant system leakage. A refueling outage was entered on November 3, 1985 and Unit 1 returned to power on December 23, 1985. Unit 1 experienced high turbine vibration due to a damaged turbine blade on August 27, 1986 and ended the assessment period in a shutdown mode while repairs were being made.

Unit 2 also began the assessment period at approximately 100% power. On July 25, 1985 the unit was shutdown to correct packing leakage and returned to power on July 28, 1985. Unit 2 was again shutdown on October 11, 1985 due to an emergency diesel generator failure and returned to power on October 15, 1985. A Unit 2 refueling outage took place from February 20, 1986 to April 1, 1986. Reactor coolant leakage caused a shutdown from August 12, 1986 to August 19, 1986 and the unit ended the assessment period at power.

The NRC approved the licensee's request for a core power upgrade toward the end of the period.

B. Inspection Activities

During the assessment period, routine inspections were performed at the North Anna facility by the resident and regional inspection staffs. A small scale emergency preparedness exercise was conducted in May of 1985 and a full scale exercise was conducted in June 1986. See Section IV.F for details on performance in this area. There were three special inspections involving an Appendix R fire protection inspection in September 1985, a review of circumstances of a security event in July 1985, and an Office of Investigations investigation concerning falsification of quality assurance records that occurred in the previous rating period.

C. Investigation and Allegation Review

There were no significant investigations or allegation activities completed during the assessment period.

D. Escalated Enforcement Actions

1. Civil Penalties

a. A severity level III violation concerning falsification of QA records which resulted in a civil penalty in the amount of

twenty thousand dollars was assessed on December 13, 1985. (This violation occurred in a previous assessment period but was issued during this period).

b. A severity level III violation concerning security which did not result in a civil penalty was assessed on August 28, 1985.

c. A severity level III violation concerning the service water intake structure modification was assessed on February 21, 1986.

d. A severity level III violation concerning external radiation levels on a transported package which did not result in a civil penalty was issued on August 8, 1986.

e. A severity level III violation concerning access control and unauthorized entry which resulted in a civil penalty of twenty five thousand dollars was issued on June 27, 1986.

2. Orders - None

E. Licensee Conferences Held During Appraisal Period

An enforcement conference was held on December 18, 1985, to discuss problems concerning the service water intake structure modification.

An enforcement conference was held on July 18, 1985, to discuss a security event regarding protective area barriers.

An enforcement conference was held on April 9, 1986, to discuss the transportation of radioactive materials and a security event regarding uncontrolled access of a contractor employee.

A management meeting was held on March 3, 1986, to discuss operator requalification examination results.

An enforcement conference was held on September 26, 1986, to discuss NRC office of Investigations report on the falsification of QA records. (This subject matter was addressed in the previous SALP).

F. Confirmation of Action Letters

None were issued.

G. Review of Licensee Event Reports and 10 CFR 21 Reports submitted by the licensee.

During the assessment period, there were 52 LERs reported. The distribution of these events by cause, as determined by the NRC staff, was as follows:

CAUSE	UNIT 1	UNIT 3	TOTAL
Component Failure	14	8	22
Design	1	1	2
Construction/Fabrication/ Installation	3	-	3
Personnel:			
Operating Activity	3	1	4
Maintenance Activity	3	2	5
Test/Calibration Activity	4	1	5
Other Activity	5	1	6
Out of Calibration	-	-	-
Other	3	2	5
TOTAL	36	16	52

H. Licensing Activities

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

- Core Uprate (2775 MWt to 2893 MWt) — 08/25/86
- Emergency Diesel Generator Problems — 07/04/86 (Monitoring)
- Receipt and Storage of Surry Spent Fuel Assemblies at North Anna Units 1 & 2 — 04/21/86
- Service Water Mechanical Cleaning and Refurbishment Program — 10/25/85 (Monitoring)
- Appendix R Reanalysis Effort Plant Modifications and Exemption Requests — (Ongoing)
- Integraded Implementation Schedule — (Ongoing)
- Maintenance for Reactor Trip Breaker

Significant amendments included:

- Reduce testing requirements for EDG's (GL 86-15)
- Revise TS in response to Generic Letter 83-37
- Add post-accident sampling program to Administrative Controls

- Revise reactor coolant system chemistry for chlorides and fluorides
- Minimum decay time (150 hours) prior to movement of fuel (refueling operations)
- Correct errors existing in Radiological Effluent TS
- Reduce boron concentration in boron injection tank and boric acid system
- Eliminate Rod Bow Penalty on nuclear enthalpy hot channel factor
- Revise TS for allowable time that one redundant service water header can be inoperable (72 hours to 168 hours)
- Generic Letter 84-13, "Technical Specifications for Snubbers," dated May 3, 1985
- Modify snubber visual acceptance criteria and establish functional test methods for large bore snubbers
- Allow operation with positive moderator temperature coefficient at less than 70% rated power
- Update pressure-temperature limit curves for heatup and cooldown
- Suspend MTC measurements for end-of-cycle moderator temperature coefficient
- Permit entry into airlock for repair of inoperable inner air lock door
- Revise TS to reflect installation of new containment isolation valve
- Allow widening of axial flux difference bands
- Allow receipt and storage of 500 spent fuel assemblies from Surry 1&2
- Update security, contingency and guard training and qualification
- Organizational Changes
- Delete redundancy in reporting requirements for TS 6.5.3.1
- Correct errors for seismic instrument range and testing requirements
- LCO and Surveillance Requirements for reactor trip bypass breakers

- Correct error in Action Statement for Overtemperature Delta T and Overpower Delta trip instrumentation
- Revise TS to address EDGs (Generic Letter 84-15) for NA-1 and correct errors NA-2 EDG TS
- Increase rated core power level from 2775 MWt to 2893 MWt

I. Enforcement Activity

UNIT SUMMARY

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	D	V	IV	III	II	I
UNIT NO.	1/2	1/2	1/2	1/2	1/2	1/2
Plant Operations	1/1	2/2	2/0			
Radiological Controls		1/1	1/1	1/1		
Maintenance		2/1	2/1			
Surveillance		3/2	1/2			
Fire Protection	1/1					
Emergency Preparedness						
Security			1/1	2/2		
Refueling						
Training						
Quality Programs and Administrative Controls Affecting Quality			2/2	2/2		
TOTAL	2/2	8/6	9/7	5/5		

FACILITY SUMMARY

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	D	V	IV	III	II	I
Plant Operations	1	2	2			
Radiological Controls		1	1	1		
Maintenance		2	2			
Surveillance		3	3			
Fire Protection	1					
Emergency Preparedness						
Security			1	2		
Refueling						
Training						
Quality Programs and Administrative Controls Affecting Quality			2	2		
TOTAL	2	8	11	5		

J. Reactor Trips

Unit 1

Nine unplanned reactor trips and eight unplanned manual shutdowns occurred during this evaluation period. The reactor trips are listed below.

September 17, 1985 - The reactor was manually tripped due to a group of rods dropping into the core.

October 24, 1985 - The reactor was manually tripped due to a failed 480 volt AC circuit breaker resulting in the loss of cooling water to the reactor coolant pumps.

January 19, 1986 - The reactor automatically tripped from approximately 4% power due to the turbine overspeed test switch being inadvertently turned in the wrong direction.

February 23, 1986 - The reactor automatically tripped from 100% power due to a electro hydraulic control system failure resulting in all the governor valves closing.

March 26, 1986 - The reactor automatically tripped from 100% power due to the inadvertent closure of the 'B' steam generator trip valve.

May 20, 1986 - The reactor automatically tripped from 100% power due to the inadvertent closure of all three main feedwater regulating valves.

May 31, 1986 - The reactor automatically tripped from 100% power due to the failure of the alternate power supply to vital bus 1-I.

August 14, 1986 - The reactor automatically tripped during startup due to a failure of a temporary jumper installed on an Intermediate Range (IR) instrument drawer. The jumper was installed to allow IR drawer replacement.

August 27, 1986 - The reactor was manually tripped from 100% power due to a failure of a low pressure turbine blade.

Unit 2

Seven unplanned reactor trips and eight unplanned manual shutdowns occurred during this evaluation period. The reactor trips are listed below.

March 23, 1985 - The reactor was manually tripped from 100% power due to a fault in the offsite power distribution system.

April 26, 1985 - The reactor automatically tripped from 100% power due to an inadvertent deenergization of a 125 VAC vital bus.

February 20, 1986 - The reactor automatically tripped during a shutdown, while in Mode 3, due to a spike in the source range instrumentation.

April 11, 1986 - The reactor automatically tripped from 70% power due to a failure of the permanent magnet generator on the main generator.

April 16, 1986 - The reactor automatically tripped during startup in Mode 2 due to a spike in the first stage impulse pressure.

May 29, 1986 - The reactor automatically tripped from 100% power due to the inadvertent opening of the stationary coil power supply disconnect to the rod control power distribution cabinet causing 12 rods to drop into the core.

June 29, 1986 - The reactor automatically tripped due to a fault in the offsite power distribution system similar to the trip March 23, 1985.

K. North Anna Gaseous and Liquid Effluent Release

Gaseous (curies for two units)

	RII 1985 AV	1985	1/1-6/30/86
Fission and Activation Gases	13140	8053	4556
Iodine	0.30	.065	.003
Particulate	.0144	.021	.001
Tritium	760	8.9	21

Liquid (curies for two units)

	RII 1985	1985	1/1-6/30/86
Fission Activation Products	1.9	5.1	0.445
Tritium	770	1480	685

ENCLOSURE

SALP BOARD REPORT

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

SYSTEMATIC ASSESSMENT OF LICENSEE PERFORMANCE
INSPECTION
REPORT NUMBER

50-280/86-23 and 50-281/86-23

Virginia Electric and Power Company

Surry Plant Units 1 and 2

March 1, 1985 through August 31, 1986

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

An NRC SALP Board, composed of the staff members listed below, met on November 5, 1986, to review the collection of performance observations and data to assess licensee performance in accordance with guidance in NRC Manual Chapter 0516, "Systematic Assessment of Licensee Performance." A summary of the guidance and evaluation criteria is provided in Section II of this report.

This report is the SALP Board's assessment of the licensee's safety performance at Surry for the period March 1, 1985 through August 31, 1986.

SALP Board for Surry:

R. D. Walker, Director, Division of Reactor Projects (DRP), RII (Chairman)
V. W. Panciera, Deputy Director, Division of Reactor Safety, RII
J. P. Stohr, Director, Division of Radiation Safety and Safeguards, RII
V. L. Brownlee, Chief, Reactor Projects Branch 3, DRP, RII
L. S. Rubenstein, Project Director, PWR Licensing Division-A, NRR
W. E. Holland, Senior Resident Inspector, Surry, DRP, RII
C. P. Patel, Project Manager, PWR Licensing Division-A, NRR

Attendees at SALP Board Meeting:

A. J. Ignatonis, Chief, Reactor Projects Section 3B, DRP, RII
K. D. Landis, Chief, Technical Support Staff (TSS), DPR, RII
R. P. Croteau, Project Engineer, Reactor Projects Section 3B, DRP, RII
C. J. Paulk, Reactor Engineer, TSS, DRP, RII
T. C. MacArthur, Radiation Specialist, TSS, DRP, RII

II. CRITERIA

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

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

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

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

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

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

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

The functional area being evaluated may have some attributes that would place the evaluation in Category 1, and others that would place it in either Category 2 or 3. The final rating for each functional area is a composite

of the attributes tempered with the judgement of NRC management as to the significance of individual items.

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

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

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

III. SUMMARY OF RESULTS

A. Overall Facility Performance

The Surry nuclear power station is well managed by qualified and experienced personnel. The corporate senior management involvement to improve quality and plant performance was evident by the licensee's use of such programs as the Nuclear Performance Monitoring where 34 performance indicators are trended on a monthly basis, implementation of Quality Maintenance Teams for the improving maintenance activities, responsiveness to NRC initiatives, and maintaining good communications with the NRC. Acceptable performance at the plant level was also observed. Strengths were identified in the functional areas of plant operations, fire protection, and licensing activities.

During the SALP period the Surry facility had high availability, low forced outages rate, and fewer than the industry average of reactor trips, safety system actuations, and safety system failures. For the performance indicator of inadvertent automatic reactor trips, the licensee has set an ambitious goal of not having more than two automatic reactor trips per unit per year. The actual trip rate (automatic and manual) was 4.7 per year and 2.7 per year for Units 1 and 2, respectively. This rate is low when compared to the actual 1985 industry average which was six reactor trips per year. The licensee has performed satisfactorily in all other functional areas. In the radiological controls area, however, the cumulative man-rem exposure was higher than the national average. The licensee is cognizant of this and is working to reduce the total future exposure by implementing various programs which include the removal of selected snubbers and cleanup of contaminated areas. In the maintenance area, the NRC has noted that the corrective maintenance items backlog was not being efficiently reduced. As the new work orders were being added to the list and appropriately so, the older items were not being cleared at the same rate. Again, the licensee is cognizant of this and is trending the backlog. The licensed operator training program may need

to be strengthened because the requalification program was found to be marginally acceptable based on the examination results.

In conclusion, the licensee is implementing new and innovative techniques to improve quality and performance in various disciplines of plant operations including the information received from international agreement programs. Also, the licensee is working with INPO to complete their training programs accreditation.

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

Functional Area	Previous SALP Dates	Current SALP Dates
	September 1, 1983 February 28, 1985	March 1, 1985 August 31, 1986
Plant Operations	2	1
Radiological Controls	1	2
Maintenance	2	2
Surveillance	3	2
Fire Protection	Not Rated	1
Emergency Preparedness	2	2
Security	1	2
Refueling/Outages	1	2
Training	2	2
Quality Programs and Administrative Controls Affecting Quality	2	2
Licensing Activities	1	1

IV. PERFORMANCE ANALYSIS

A. Plant Operations

1. Analysis

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

The Surry facility was properly managed and operated by the corporate office and plant staff during this assessment period. The plant staff was knowledgable and proficient in normal plant operations and performed well during transient operations such as power excursions or shutdowns. Management involvement in operations was apparent throughout the assessment period. The licensee was responsive when violations were identified by the NRC and also implemented appropriate corrective actions for items identified by internal audit groups. The licensee's knowledge of regulations, guides, standards and generic issues was good, and

interpretations of these documents and associated issues were acceptable. The plant staff generally responded to plant trips and other operational events during this review period in a professional and competent manner.

During this SALP period Surry Units 1 and 2 experienced a total of seven and four reactor trips, respectively. This converts to a trip rate of 0.67 per 1000 critical hours (4.7 per year) for Unit 1 and 0.41 per 1000 critical hours (2.7 per year) for Unit 2. These rates compare favorably with the 1985 industry wide average of 6.0 trips per year and the average rate of 1.04 trips per 1000 critical hours (6.8 per year) for Westinghouse plants. Also, the licensee has established a goal of having no more than two automatic reactor trips per unit per calendar year. As of August 31, 1986, this goal was met for both units.

Out of the seven reactor trips for Unit 1, two trips were manual and five trips were automatic. The review of the reports submitted by licensee indicates that four of the seven reactor trips were caused by personnel errors. One trip was manually initiated due to arcing on the 'A' phase bus duct. Two reactor trips were caused by equipment failures. Of the four Unit 2 reactor trips one was a manual trip and three were automatic reactor trips. One trip was caused by personnel error and three trips were caused by equipment failures. The reactor trips are described in Section V.J. of this report.

The above data reflects positive results of licensee actions initiated during the previous evaluation period to reduce the number of reactor trips. The number of unplanned reactor trips was substantially reduced during this reporting period. Also, human performance evaluation staff reviews of operating events continued to improve operational performance.

Additional plant operational statistics observed during this SALP period are presented below.

Operational Parameters	Unit 1	Unit 2
Unit Availability Factor (%)	78	73
Unit Capacity Factor - Design Electrical Rating (%)	72	66
Forced Outage Race (%)	1.0	5.3

The Surry Units 1 and 2 availability factors, the unit capacity factors, and the forced outages rate compare favorably with the industry averages for 1985 which are 68.5%, 61.7%, and 11.3%, respectively. Thus, all of these indicators for both units indicate an index of merit of plant performance which is better than the industry average.

During this SALP period, the licensee reported 37 reportable events within the time limits of 10 CFR 50.72. However, some of these Immediate Notifications were not reported within the time limit specified by 10 CFR 50.72. This concern was conveyed to the licensee and corrective action was taken.

The licensee submitted 58 Licensee Event Reports (LERs), during this SALP period. The LER analyses were carefully done and thorough. For the most part, both the Immediate Notifications and the LERs suggest that the licensee took appropriate action with regard to the reported events. Also, an evaluation of the content and quality of a representative sample of LERs was performed by the NRC using a refinement of the basic methodology presented in NUREG/CR-4178, March 1985. The results show that the Surry LERs have an overall average score of 8.5 out of a possible 10 points, compared to a current industry average of 7.9. The weaknesses identified in the LERs in terms of safety significance, involved the requirement to identify failed components in the text and adequately identify component failures that may prompt a generic concern. The strengths identified were in the discussion involving root cause identification; assessment of safety consequences; failure mode, mechanism, and effect of failed components; personnel errors; and safety system responses.

The introduction of the corporate Nuclear Operations Department monthly report entitled "Nuclear Performance Monitoring - Management Information Report" has provided trending information for management personnel in 34 different areas. Some of the areas are: Forced Outage Rate, Reactor Trips, Safety System Events, Personnel Radiation Exposure, Control Room Annunciators, Temporary Modifications, Quality Assurance Findings, etc. This monthly trending report is a valuable tool for management in assessing performance and identifying problem areas. Corporate management was often involved in site activities and reviews, utility policies were appropriately stated, disseminated and implemented. The corrective action program for deficiencies appeared to address all concerns (both reportable and nonreportable) in a timely and effective manner. The licensee was also responsive to NRC concerns and requests.

Control room formality and behavior were maintained at high professional levels. The licensed operators performed their duties in a highly professional manner which promulgated unit operation in a safe and efficient manner. With the exception of one violation on failure to follow procedure, plant procedures were followed and postings prohibited control room entry to all but those on official business. Management involvement with plant operations was evident where the licensee has not only instituted the human performance evaluation system which supplements the post reactor trip review but also added the check operator program used to enhance the qualifications of operations personnel. This is a

self-evaluation of operators in which a more experienced operator reviews the performance of new personnel at the simulators and in the control room. Also, the licensee is putting into place a uniform attire program accomplished through their own employee involvement teams. Approximately 1200 people will wear uniforms.

The licensee's response to NRC initiatives was timely and adequate. The resolution of safety and technical issues was sound and thorough. The licensee's operations program continued to provide the necessary leadership and professional attitude which has maintained a high level of plant performance.

One violation was identified during this assessment period.

Severity Level IV violation for having charging pump intermediate seal coolers inoperable on Unit 2 due to the failure of personnel to use approved procedures when performing safety-related evolutions. (85-07)

2. Conclusion

Category: 1

3. Board Recommendations

The licensee's management involvement in assessing plant operations performance and establishing goals for improvement has contributed to the licensee's receipt of a Category 1 rating in this area. The Board was also pleased to note an apparent effectiveness of the licensee's reactor trip reduction program. No changes to the NRC's inspection resources are recommended.

B. Radiological Controls

1. Analysis

During this evaluation period, inspections of radiological controls were conducted by the resident and regional based inspectors, including a confirmatory measurements inspection using the Region II mobile laboratory.

The licensee's health physics (HP) staffing level was adequate to support routine operations. For refueling outages, additional contract HP technicians were used to supplement the permanent plant HP staff. During the assessment period, the licensee was increasing the size of the onsite HP staff, and was adding

additional personnel to the technical staff which would provide support functions for HP and chemistry.

During 1985, the licensee completed development of a formal training and qualification program for radiation protection technicians. The program was submitted to the Institute of Nuclear Power Operations for review, and was accredited in May 1986.

One strength noted in the health physics program was the stability of the health physics technician staff. The low attrition rate has resulted in a more experienced group of individuals and has provided the time necessary to implement an effective and continuing training program for the technicians.

The performance of the health physics staff in support of routine outage operation was good. No substantive issues were identified in this area.

Management support and involvement in matters related to radiation protection and radwaste control was adequate. Health physics management was involved sufficiently early in outage preparations to permit adequate planning. The station health physicist received the support of other plant managers in implementing the radiation protection program.

Audits performed of the health physics program by the corporate staff were of sufficient scope and depth to identify problems and adverse trends. Additionally the site internal audit organization conducted audits of the health physics program using personnel that were experienced in the health physics area. Appropriate corrective actions were taken and documented.

During the evaluation period, the licensee's radiation work permit and respiratory protection programs were found to be satisfactory. Control of contamination and radioactive materials within the facility was generally adequate. At the beginning of January 1985, the licensee maintained 51% of the total area regarded as Radiological Control Area (RCA) under contamination controls. The RCA did not include the containments or the fuel pool. By the end of 1985, the area under contamination controls had been reduced to approximately 40% of the total RCA.

The licensee's instrument calibration program was reviewed during this period and several areas which required improvement were identified. The instrument calibration program did not include verification of calculated decay curves for all calibration sources and the procedures did not include several significant aspects of an instrument calibration program.

During 1985, the licensee's cumulative exposure was 820 man-rem per unit as measured by thermoluminiscent dosimeter (TLD). For 1986, the total exposure through July 1986, as measured by TLD was 725 man-rem per unit. These values are well above the 1985 national average of 425 man-rem per unit observed at similar PWR facilities. While the licensee's approach to resolving the higher than normal man-rem exposure results appears not to have been effective during this SALP period, the data based on a longer term (1980 through present) shows a declining trend. Nevertheless, the total exposure is high. The licensee has instituted personnel radiation exposure reduction efforts such as source term reduction involving chemical decontamination, reactor vessel head shielding, removal of selected snubbers, and the reduction of contaminated areas. The effectiveness of the above measures is yet to be determined. During the assessment period, no overexposures either internal or external, were identified.

During 1985, the licensee made 84 solid radioactive waste shipments totalling 71,500 ft^3 (35,750 ft^3 per reactor) and containing 1,206 curies of activity. These values are well above the national average of 11,650 ft^3 per reactor shipped by other utilities with similar facilities. The licensee's approach to reducing the large volume of solid radioactive material shipped appears to have been effective since only 11,200 ft^3 containing 506 curies of activity have been shipped as of July 1986. One violation in this area was identified for failure to meet the stability requirements for solid radwaste as described in 10 CFR 61.56.

During this evaluation period, the licensee's approach for resolving technical issues in the area of meeting the requirements of 10 CFR 20.311 for classifying all radioactive waste for burial in accordance with 10 CFR 61.55 was reviewed. Two violations were identified. These violations are listed below as violation a. and c.

The liquid and gaseous effluent program was adequately managed. The total quantity of radioactivity in liquid effluents has been steadily decreasing since 1983. In 1983, gaseous releases were generally below the Region II average for two PWR units. The release rate through June 30, 1986, shows some increase over 1985, but are still below 1985 Region II average rate.

The total quantity of radioactivity in liquid releases at Surry in 1985 were significantly above the Region II average. Release in the first 6 months of 1986 continued at about the same rate as in 1985. There was no unplanned liquid release in excess of Technical Specification reporting limits. There was one gaseous release of 28.6 Ci of xenon-133 which exceeded the Technical Specification reporting limit. The environmental monitoring program did not indicate any significant increase of radioactivity

levels in the environment during 1985. The total quantity of radioactivity in gaseous and liquid releases is tabulated in Section V.K. of this report.

Calculated radiation doses due to liquid and gaseous effluents for 1985 were well below the 25 millirem per year limit. Maximum doses due to liquid effluents were 0.0305 mrem (whole body) and 0.203 mrem (organ). Maximum doses due to gaseous effluents were 1.1 mrad gamma, 3.02 mrad beta, and 0.23 mrem (thyroid).

There were no major changes to the licensee's radioactive liquid, gaseous, or solid waste treatment systems during 1985.

Major improvements in the chemistry control program had been initiated in the following areas: the design of selected components of the secondary water cycle; the physical facilities used by the chemistry staff; the instrumentation used for control and diagnosis of plant chemistry; and the chemistry staff. Chemistry control had been well within the Steam Generator Owners Group (SGOG) guidelines. When the ongoing upgrade program has been completed (in conjunction with Westinghouse) the licensee will have the most advanced chemistry capabilities in the Region. There were numerous indications that this improvement program is the result of increased attention from plant and corporate management.

The quality control program for radiological measurements met the general guidance of Regulatory Guide 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment." Although the overall structure and procedures for quality control were adequate, the need for closer management review of procedures and their applicability to the Radiological Effluent Technical Specifications was noted. This lack of management review resulted in the violation noted below. Licensee results for gamma measurements in samples split with the NRC showed good agreement for all sample types. Licensee results for radiochemical analyses of H-3, Sr-89 and Sr-90 were in good agreement for 1985, however, during 1986 the results for the analyses of Fe-55 was 26% higher than the known values. The results demonstrated the need for improved review of the vendor laboratory's quality control program to ensure the validity of measurements.

Three violations were identified:

a. Severity Level IV violation for failure to adequately determine the concentration of certain radionuclides by use of scaling factors as required by 10 CFR 61.55 (85-21).

b. Severity Level V violation for failure to have procedures for determination of gamma spectroscopy lower limits of detection (85-29).

c. Severity Level V violation for failure to meet the stability requirements of radioactive material shipped for burial as described in 10 CFR 61.56 (86-21).

2. Conclusion

Category: 2

3. Board Recommendations

Although the licensee has taken steps in reducing the cumulative man-rem exposure and radioactive waste shipments which are above the national average, management attention should continue to be focused in this area for further reduction. No changes to the NRC's inspection resources are recommended.

C. Maintenance

1. Analysis

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

The maintenance program appeared to be technically sound, procedures and plans were adhered to, and records were adequately maintained. The licensee has a positive nuclear safety attitude with regard to maintenance and has implemented a viable preventive and corrective maintenance program. However, it was observed that the licensee's corrective maintenance backlog (i.e. outstanding work orders) has not decreased to their set goal for 1986. In the last six months of this SALP period the outstanding work orders were consistently above the goal trend. For August 1986, the number of outstanding work orders that are under three months and over three months was approximately 3,000; this compares to a set goal of approximately 2,250. Based on the outstanding work orders trend, it appears that the older items were not being cleared expeditiously when new items were being added as required.

Management involvement in maintenance programs is evident by the implementation of such programs as use of MOVATS equipment, Chesterton valve packing, Visual Information Management System, and incentive maintenance agreements with contractors where incentives are proposed for exceptional work and reduced pay for poor work.

Scheduled maintenance activities exhibited evidence of adequate preplanning with established priorities; however, one weakness was

uncovered with procedure preparation for unscheduled maintenance on the Unit 2 recirculation spray heat exchanger (violation d.). The maintenance procedures and policies were comprehensive and were adhered to, but occasional weaknesses were uncovered (violations a. through e.). The licensee has identified weaknesses in the overall preventive maintenance program and as a result is concentrating effort to make improvements in the preventive maintenance program.

The licensee continued to evaluate new approaches to improving the quality of maintenance. One new approach was the initiation of the "Quality Maintenance Teams" concept in mid 1985. This concept establishes a highly trained team of maintenance personnel who are given special training in the areas of preplanning, electrical maintenance, mechanical maintenance, quality assurance, and health physics. They then are assigned jobs which they accomplish as a team. The mission of the team is to perform all work assigned in a high quality manner without the involvement of additional support staff in the areas of health physic coverage and quality control inspections. The development of the quality team concept includes a formal training program which provides instruction in the fundamentals of the team approach, problem solving techniques, quality control training and inspector certification and advanced radiation worker training. Quality Maintenance Team members received high visibility and several team members recently participated in an information exchange visit to nuclear plants in Japan. Licensee management is significantly involved with Institute of Nuclear Power Operations (INPO) and NUMARC and the company has agreements with French and Japanese utilities to exchange information. A dedicated effort is underway to upgrade and modernize plant facilities.

Management resolution of safety and technical issues was sound and thorough. Management response to NRC initiatives was demonstrated by the licensee through the above mentioned maintenance program improvements.

Five violations were identified during this assessment period. The violations do not appear to indicate a programmatic breakdown.

a. Severity Level IV violation for failure to follow procedure in that electrical cable tray covers and supports were not properly reinstalled following electrical maintenance or design change work. (85-09)

b. Severity Level IV violation in the area of EQ equipment installation for improper installation of Conax electrical conductor assemblies. (85-19)

c. Severity Level IV violation for an inadequate procedure DC 85-32-1, "Vital Bus Expansion" concerning the replacement of the 1B station battery. (86-11)

d. Severity Level IV violation for inadequate procedures with regard to repair (tube plugging) of the Unit 2 recirculation spray heat exchanger B. (86-20) Unit 2 only.

e. Severity Level V violation for failure to properly document monthly periodic checks on measuring and test equipment. (85-31)

2. Conclusion

Category: 2

3. Board Recommendations

Management should continue their effort in reducing the corrective maintenance action backlog. The licensee's innovative techniques in improving maintenance work are commendable. These programs are new and have not been fully implemented during this SALP period. No changes to the NRC's inspection resources are recommended.

D. Surveillance

1. Analysis

During the assessment period, inspections were performed by the resident and regional inspection staffs in the areas of periodic surveillance testing, containment local and integrated leak rate testing, and Inservice Inspection (ISI) programs and examination of test results.

During this report period, the inspectors increased their monitoring of the licensee's accomplishment of periodic tests (i.e. surveillance testing) to more accurately evaluate the licensee's effort to improve performance in this area. Testing was observed during daily tours of the control room and other plant areas. The inspectors specifically evaluated compliance with Technical Specification requirements, control of equipment removal from service, the accuracy and completeness of test data, the acceptability of test results and the licensee's resolution of test discrepancies. Additionally, the inspectors conducted more in-depth reviews of selected major surveillance testing on safety-related systems on a monthly basis. Based on the inspector observations, improvement was noted in the area of surveillance testing during this reporting period. Improvements made in the process and control of handling and implementing Technical Specification changes have been beneficial. Increased management

attention and appropriate resources have been provided in the areas of ISI and commitment control.

Three region based inspectors visited the Surry plant in the period April 8-12, 1985, for an independent analysis of the licensee's containment leak rate test program including a review of local and integrated leak rate test reports, procedures, data and data analysis. The inspection was conducted to resolve certain issues raised during review of the test for the Unit 2 CILRT (Containment Integrated Leak Rate Test) conducted on September 11-14, 1983. As a result of this inspection, a violation (violation a.) was issued for failure to follow the requirements of 10 CFR 50, Appendix J, for the 1983 Unit 2 CILRT.

The issues identified in the review of the 1983 CILRT, prompted a followup inspection of the licensee's leak rate testing program which was performed by region based inspectors during the 1985 Unit 2 refueling outage. This inspection included witnessing the licensee's performance of an integrated leak rate test on Unit 2 in the period June 7-10, 1985 and a comprehensive inspection of both the local and integrated leak rate test methodology, test procedures, test controls, data analysis and test results. The inspectors observations indicated that the licensee had taken effective action to improve the leak rate testing program. The improvements included a revision of test procedures to ensure a quality test; increased attention to the details of test preparation, control, and performance; appropriate level of decision making to ensure a quality test; thorough analysis of test data; and, adequate review of test results. Management involvement was evident in various aspects of the test performance and contributed significantly to programatic improvements and to the conduct of a successful test. The inspectors concluded that the licensee has made significant improvement in the containment leak rate testing program since the 1983 Unit 2 local and integrated leak rate tests.

Inspections were also performed by the regional inspection staff in the areas of valve surveillance testing and Type B leak rate tests. The licensee management displayed a strong determination to correct known weak areas within the surveillance testing program. Reorganization and reassignment of responsibilities have been implemented to ensure compliance with Technical Specifications (TS).

One minor violation (violation b.) was identified in the area of test control. The overall approach to technical issues by the staff showed evidence of a clear understanding of the issues and problems, corrective actions were implemented in a timely manner with technically sound resolutions.

The licensee generally demonstrated a clear understanding of technical issues, and was responsive to NRC concerns. The reporting and analysis of surveillance events was prompt and thorough.

The licensee's snubber surveillance program was inspected and was found to be satisfactory. This program showed evidence of prior planning through well defined procedures. Records were generally complete, well maintained, retrievable and legible. The corrective action to resolve several violations including a Severity Level III violation with civil penalty identified in early 1984 was effective. The resolutions were generally conservative. Approach to resolution of these problems was technically sound and thorough. Staffing and training of snubber surveillance personnel was adequate.

Two violations were identified during the assessment period:

a. Severity Level IV violation for Type A containment leak rate testing deficiencies. (85-11)

b. Severity Level IV violation for failure to follow procedures for control of testing and review of test results. (86-05)

2. Conclusion

Category: 2

3. Board Recommendation

Management involvement was evident in making programmatic improvements in the containment leak rate testing program and implementation of better controls in performing periodic tests. No changes to the NRC's inspection resources are recommended.

E. Fire Protection

1. Analysis

During This assessment period, inspections were conducted by the regional and resident inspection staffs of the licensee's fire protection and fire prevention program.

The licensee has issued procedures for the administrative control of the fire hazards within the plant, surveillance and maintenance of the fire protection systems and equipment, and organization and training of a plant fire brigade. These procedures were reviewed and found to meet the NRC requirements and guidelines except, that the fire brigade fire fighting preplans for safety related and safe shutdown plant areas were weak in providing fire brigade

guidance in smoke control, fire damage control and fire suppression water runoff control.

The staff's inspections reviewed the licensee's implementation of the fire protection and administrative controls. General housekeeping and control of combustible and flammable materials in safety related plant areas were satisfactory. The plant fire protection features which include automatic fire extinguishing systems, fire/smoke detection systems, and fire barriers and fire barrier penetration seals in safety related areas were found to be fully functional. Surveillance inspection, tests and maintenance of the plant fire protection features were satisfactory.

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

The annual fire protection/prevention audit and 24 month QA fire protection program audit by offsite organizations and the triennial audit by an outside fire protection organization required by the Technical Specifications were reviewed. These audits were conducted within the specified frequency and covered all of the essential elements of the fire protection program. The licensee had implemented corrective action on discrepancies identified by these audits.

The licensee identified, analyzed and reported fire prevention events and discrepancies as required by their plant Technical Specifications. These reports were reviewed and found to be satisfactory.

Management involvement and control in assuring quality in the fire protection program is evident. This is demonstrated by the adequate implementation of a plant fire protection program that meets the NRC requirements and guidelines. The licensee's approach to resolution of technical fire protection issues indicates an apparent understanding of the issues and was generally sound and timely. Responsiveness to NRC initiatives was found to be timely and thorough. Fire protection violations are rare. However, when violations do occur, effective corrective action is promptly taken. Licensee identified fire protection related events or discrepancies were properly analyzed, promptly reported and effective corrective action was taken.

Staffing for the fire protection program is adequate to accomplish the goals of the position within normal work hours with occasional overtime due to a backlog of work. Fire protection staff positions are identified and authorities and responsibilities are clearly defined. The licensee's personnel are qualified for their assigned duties. The fire brigade training program is well

defined and implemented. The number of trained fire brigade members is sufficient to meet the minimum of the five brigade members per shift as required by the Technical Specifications.

No violations or deviations were identified in the fire protection area during this assessment period.

2. Conclusion

Category: 1

3. Board Recommendations

The assigned rating for this functional area was based on routine inspections of the licensee's fire protection program; no Appendix R inspections were performed during this assessment period. No changes to the NRC's inspection resources are recommended.

F. Emergency Preparedness

1. Analysis

During the assessment period, inspections were performed by the resident and regional staffs. The inspections included two routine emergency planning inspections and observation of one full participation emergency preparedness exercise.

Inspections disclosed that the licensee had an adequate emergency preparedness organization and staffing at the plant and corporate level, but, as outlined below, showed the need to increase emphasis on training of this staff. Corporate management demonstrated their involvement in the emergency preparedness program by their active participation in the emergency exercise and exercise critique.

The routine inspections and exercise showed that the licensee demonstrated the capability to detect and classify emergencies, assess plant conditions and project offsite consequences, notify offsite agencies, and make appropriate protective action recommendations, except as noted below.

During a routine inspection in 1985, one violation was identified for failure to procedurally require issuance of a prompt protective action recommendation to offsite authorities upon declaration of a General Emergency. The procedure was corrected to require such a recommendation. During the emergency exercise in October 1985, it was noted that the protective action recommendation made was not consistent with this procedure. In an inspection in March 1986, walk-throughs with Shift Supervisors showed that protective action recommendations made by the Shift

Supervisors were not consistent with one another. This was indicative of the need for improved training in the area of protective action recommendations.

During the evaluation period, there were other findings relative to the need for improvements in emergency preparedness training, including the need to develop a formalized system to document training and the need to develop clear emergency training lesson plans. Exercise observations further showed the need for improved training including findings that offsite monitoring teams were not properly briefed or equipped and that the Recovery Manager was not kept informed of dose assessment calculations.

One violation was identified during the assessment period:

Severity Level IV violation for the failure to procedurally require issuance of a prompt protective action recommendation to offsite authorities upon declaration of a General Emergency. (85-16)

2. Conclusions

Category: 2

3. Board Recommendations

Management attention should be directed towards the development and improvement in the training program for emergency preparedness. No change to the NRC's inspection resources are recommended.

G. Security and Safeguards

1. Analysis

During this evaluation period, routine inspections were performed by the resident and regional inspection staffs.

Corporate and site management's support and security awareness continued to be positive; however, since the last SALP rating period the Surry enforcement history indicates some areas of the program have degraded. During the current SALP reporting period Surry Power Station has been cited for two Severity Level III violations and three Severity Level IV violations. The most recent Severity Level III violation involved the failure to conduct a proper search at the access control point, which resulted in the introduction of an unloaded rifle into the protected area. A previously cited Severity Level III violation resulted from a licensee employee, previously authorized unescorted access in the protected area, departing and re-entering the protected area through an open vehicle gate without being

identified, searched or being issued a security photo identification badge. The individual remained in the protected area more than three hours without being detected. The three Severity Level IV violations were similar in that they all related to failure to maintain the integrity of protected or vital area barriers. While the identified violations reflected continued deficiencies in the control of access to the facility, and failure to maintain barrier integrity, the licensee continues to take strong measures to prevent personnel error, provide improved procedures and ensure adequate training of security personnel.

The licensees efforts to ensure the resolution of operational and functional security issues continued to be positive and reflected managerial attention and corporate support as evidenced by the renovation of the secondary access portal. Responsiveness to NRC initiatives was timely, and the licensee had provided evidence of prior planning and generally assigned proper priorities to safeguards matters. The licensee demonstrated security initiative in the installation of vehicle barriers at the avenues of approach to the site.

The licensee has continued to provide prompt and thorough corrective actions to violations of regulatory requirements and identified technical issues raised during security inspections. The violations noted below were not indicative of the total effectiveness and proficiency of the security program at the Surry Nuclear Station. However, it is apparent that continued management attention is necessary to ensure that the performance level of individual members of the security force is enhanced through training and supervisory attention.

The violations identified were as follows:

a. Severity Level III for failure to control access to the protected area. (85-30) No civil penalty was issued.

b. Severity Level III for failure to conduct a proper search at the access control point. (86-03) No civil penalty was issued.

c. Severity Level IV for failure to maintain surveillance over part of the protected area barrier. (86-03)

d. Severity level IV for failure to provide intrusion detection capability for penetration of the protected area perimeter. (86-16)

e. Severity Level IV due to removal of security barriers between the protected and vital area. (85-14)

2. Conclusion

Category: 2

3. Board Recommendations

Based on the review of the licensee's enforcement history during this assessment period, the Board has noted deficiencies in access and barrier controls. The licensee should continue to place emphasis on maintaining controls of access to the facility and barrier integrity. No changes to the NRC's inspection resources are recommended.

H. Outages

1. Analysis

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

The regional staff reviewed the licensee's work in the design change and modification program. The review of the design change and modification program revealed that the licensee had identified, by audit and surveillances problems in this area. The corrective actions for these findings were acceptable.

Surry Unit 2 conducted a refueling outage from March 20, 1985 to June 27, 1985. Surry Unit 1 conducted a refueling outage from May 10, 1986 to July 12, 1986. The refueling activities on both units were adequately preplanned with realistic assignment of priorities and control of activities. Refueling procedures were adequate to accomplish the associated tasks efficiently and safely. Adequate levels of management attention were observed during refueling. Refueling crew staffing and staff training were observed to be adequate. The licensee conducted fuel assembly movements, containment purging, and system venting operations; all were adequate. Corporate fuel management representatives as well as site management were directly involved in the refueling and fuel inspection activities. Refueling was accomplished in accordance with adequately preplanned, properly reviewed, and approved procedures. Technical problems encountered during refueling were promptly resolved in a competent and safety conscious manner. Post refueling startup test records were adequate and showed that the tests had been performed acceptably.

During the Unit 1 refueling outage the operations personnel discovered that one of the twenty control rodlets of the Rod Cluster Control Assembly (RCCA) was broken off and left in a fuel assembly. This condition appears to have existed during a portion of the fuel cycle 7 operation where the rodlet may have been fully inserted into the core when it should have been fully withdrawn and then during fuel cycle 8 operation where the same rodlet was

missing from the shutdown bank which was fully withdrawn. The licensee has performed an extensive evaluation of core parameters during the two fuel cycles that the above described condition existed and determined that the existing accident analyses remained valid, with no new accident types being created. There was no reduction in safety margin required by Technical Specifications. The licensee's approach to resolution of this issue was complete and typical of their normal resolution of complex issues.

Several fuel failures were experienced during this period on Unit 1. Fuel element failures did not reflect unfavorably on the way the plant was refueled or operated. The failures appeared to result from poor cleanliness control during steam generator replacement, as well as potential vendor manufacturing inadequacies.

The licensee has completed construction of the first phase of an on-site dry cask spent fuel storage facility. The facility was licensed on July 2, 1986. The first fuel elements are scheduled to be placed in casks and moved to the dry cask storage facility in the the fall of 1986.

A strength was noted in the licensee's technical investigation and understanding of metallurgical conditions that required evaluation to determine the need for repairs and other corrective actions. No significant weaknesses were observed in the licensee's performance of inservice inspections.

Management involvement and control in assuring quality was evident. Evidence of prior planning and assignment of priorities was observed and decision making was usually at a level that ensured adequate management review. Records were complete and available. The licensee generally provided viable and sound responses to NRC initiatives. The licensee's approach to resolution of technical issues was conservative and a clear understanding of the issues was demonstrated.

No violations were identified during the evaluation period.

2. Conclusion

Category: 2

3. Board Recommendations

No changes into the NRC's inspection resources are recommended.

I. Quality Program and Administrative Controls Affecting Quality

1. Analysis

During this evaluation period, routine inspections were performed by the resident and regional inspection staffs. The regional staff specifically reviewed the offsite support staff, the offsite review committee, licensee actions on previous enforcement matters, QA program review management oversite of performance indicators, licensee actions on previously identified inspection findings, and test and experiments.

For the purpose of clarification, Region II defines this area as the ability of the licensee to identify and correct their own problems. As such it encompasses the entire plant operation, all plant personnel, as well as those corporate functions and personnel that provide sources to the plant. The plant and a corporate QA staff is a part of the entity, and as such, is mainly responsible for verifying quality. The rating in this area specifically denotes the results for various groups in achieving quality as well as the QA staff in verifying that quality is achieved.

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

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

An innovative approach in using Quality Maintenance Teams to improve maintenance activities.

Management involvement in the maintenance area where new programs such as Chesterton valve packing, Visual Information Management System, and maintenance agreement with contractors have been introduced to improve performance.

Nuclear performance monitoring where 34 performance indicators are trended on a monthly basis.

The assistance of corporate fuel management during the refueling outage and the rapid solution of technical issues.

High degree of management involvement in licensing activities.

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

Inefficient reduction of the corrective maintenance item backlog. The total number of outstanding work orders remained above the licensee's set goal for the past several months. This observation was based on the review of the licensee's performance indicator trends.

Degradation of security awareness relative to the enforcement history from the last SALP period.

Lack of management involvement in the preparation, conduct, and review of containment integrated leak rate testing (CILRT). Deficiencies were identified during this SALP period in reviewing the 1983 Unit 2 CILRT data. However, since this identification the licensee has made significant programmatic improvements in this area.

Lack of management attention in the determination of the need for improved training in the area of emergency preparedness.

Offsite support staff activities appeared to be well controlled and various staff members understood their responsibilities and authorities. Corporate staff members frequently visit the site to augment their support function. Corporate staff groups exhibited close working relationships which resulted in coordinated support to the site.

The Independent and Operating Event Review Group (IOER) is undergoing changes since a new manager was appointed in early 1986. Some of the changes include performance of new evaluations in certain areas, streamlining the reviews and information dissemination. The licensee has also formed a Nuclear Overview Committee (NOC) which is made up of upper level management which reviews IOER activities.

The licensee QA program, VEPCO Topical Report (Revision 1-5A), was approved by the NRC on February 13, 1986. Interviews with licensee personnel identified that personnel were aware of existing QA program requirements. Sixteen documents are being revised to incorporate upper tier requirements.

The licensee utilizes a Nuclear Performance Monitoring Management Information Report, which is prepared monthly, to provide an overview of nuclear plant performance. This report has the capability to monitor up to 34 performance indicators. Management acts accordingly if negative trends are identified. Establishment of this report and other tracking and trending mechanisms is indicative of managements support in improving quality.

The test and experiments program meets the requirements.

The licensee is responsive to NRC concerns as evidenced by successful closing of previously identified enforcement matters and inspection findings.

One violation was identified this assessment period.

Severity Level IV violation for failure to assure that vendor identified conditions adverse to quality are promptly identified and corrected (86-02)

2. Conclusion

Category: 2

3. Board Recommendation

No changes to the NRC's inspection resources are recommended.

J. Training and Qualification Effectiveness

1. Analysis

In this evaluation period the regional staff assessed the licensee's training program in different disciplines of the licensee's organization during the routine inspections performed in the functional areas addressed in this SALP report. Training of personnel was looked into in such areas as plant operations, quality assurance, health physics, emergency preparedness, fire brigade, and security. Except for emergency preparedness, no particular deficiencies were identified in the areas reviewed. Routine emergency preparedness inspections and an emergency exercise observation identified weaknesses in the licensee's protective action recommendations and in the communications between different organizational groups. This indicated a need for improved training in these areas.

The licensee has been participating with INPO (Institute of Nuclear Power Operations) to establish new programs for plant performance improvement. In particular these include the INPO Accreditation Program and the Human Performance Evaluation System (HPES) wherein all plant events caused by human error are investigated using guidelines and methodologies established by INPO and the results transmitted to INPO for use in an HPES data base. INPO has accredited the licensee's licensed operator and non-licensed operator training programs, the radiation protection training program, and the electrical and mechanical technician training programs. INPO is scheduled to review the instrumentation and control, shift technical advisor, and engineer training programs in 1987.

The check operator training program was instituted during this SALP period. This program is designed to use experienced and well qualified licensed operators to evaluate performance of new operators that are being trained on the simulator and assigned on shift in the control room.

Two sets of replacement operator licensing examinations and one requalification examination were administered during the SALP rating period. The operating and written examinations administered in April 1985 and July 1986 resulted in eleven of fifteen Senior Reactor Operator (SRO) candidates and eight of twelve Reactor Operator (RO) candidates passing. The requalification examination administered in December 1985 resulted in four of six SRO candidates and four of six RO candidates passing. The requalification program was deemed marginally acceptable based on the examination results.

The replacement examination passing rate of 70% was consistent with the industry average.

2. Conclusion

Category: 2

3. Board Recommendations

No changes to the NRC's inspection resources are recommended.

K. Licensing Activities

1. In general, the licensee's management has demonstrated a high level of involvement and control in assuring quality. Prior planning and assignment of priorities were consistently evident. The licensee's management consistently exercised good control over its activities and has maintained effective communications with the project manager. This was specifically evident during the staff review of the amendment request submitted in response to recently revised General Design Criterion-4 (GDC-4). The management involvement was very obvious in resolving a licensing action on Confirmatory Order for NUREG-0737, Supplement 1 items. The corporate management is frequently involved in site activities. The management involvement in licensing of Independent Spent Fuel Storage Installation was quite obvious.

One area where management involvement could be increased is the area of Inservice Inspection and Testing. The quality of ISI/IST program submittals could be improved by making revisions to both units program consistent and timely.

The licensee almost always demonstrates a clear understanding and approach to resolution of technical issues. Conservatism is being exhibited in relation to significant safety issues on a routine basis. The resolutions of the technical issues are technically sound, thorough and timely in almost all cases. This was obvious during recent Equipment Qualification audit conducted for the Surry station.

The good communications between the licensee and NRC staff have been beneficial to both in the processing of licensing actions and minimizing the need for additional information. The licensee's involvement in Technical Specification Improvement Program has been noteworthy.

The licensee has been very responsive to NRC initiatives in almost all cases. The licensee is always cooperative in agreeing to meet with the NRC staff whenever the circumstances call for a meeting. The licensee has made every effort to meet established commitments and provided adequate justifications whenever the established deadline cannot be met. It is a common practice for the licensee to expeditiously report to the Project Manager any abnormal event regardless of its reportability requirements. Also, the licensee notifies the Project Manager well in advance of forthcoming requests for amendments or a review of safety issues. Technical issues are resolved in a timely manner. In most cases, initially proposed resolutions by the licensee are acceptable.

The licensee has adequate staff for licensing activities. The licensing group has exhibited a high degree of cooperation with the NRC staff. Areas of responsibilities are well defined within the organization. The licensee maintains the staff at the site which is familiar with the plant operation, and which is responsible for supporting licensing activities at headquarters. This staff is very helpful in integrating licensing activities with plant operation at the site.

2. Conclusion

Category: 1

3. Board Recommendations

None.

V. SUPPORTING DATA AND SUMMARIES

A. Licensee Activities

Unit 1 began the assessment period operating at power. In August of 1985 a two week maintenance and snubber inspection outage took place. On January 24, 1986, Unit 1 was manually tripped for a maintenance and snubber inspection outage. The unit returned to power on February 7, 1986. On May 10, 1986, Unit 1 was shutdown for a refueling and maintenance outage which lasted until July 12, 1986, when the unit was restarted. Unit 1 ended the assessment period operating at power.

At the start of the assessment period, Unit 2 was in a refueling and ten year inservice inspection outage. On June 28, 1985, Unit 2 returned to power operation. On October 19, 1985, Unit 2 entered a

maintenance and snubber inspection outage which lasted until November 7, 1986, when the unit was restarted. Another maintenance and snubber inspection outage took place from February 16, 1986 through February 24, 1986.

Unit 2 was shutdown on June 17, 1986, due to a one gallon per minute service water expansion joint leak inside containment which could not be repaired within the TS Limiting Condition of Operation time frame. The leak was repaired and the unit was returned to power on July 3, 1986. On July 29, 1986 a recirculation spray heat exchanger tube leak was discovered and the unit was shutdown on July 23, 1986. Seven tubes were plugged and the unit was restarted on July 27, 1986. Unit 2 ended the assessment period operating at power.

An on-site, dry independent spent fuel storage facility was licensed by the NRC in July 1986. The licensee was preparing to load spent fuel into the casks at the end of the assessment period.

B. Inspection Activities

During the assessment period, routine inspections were performed at the Surry facility by the resident and regional inspection staffs. A full scale emergency preparedness exercise was conducted in October 1985 as described in Section IV.F, above. Two announced inspections were conducted: one in the area of Equipment Qualification; and the other one was an evaluation of the licensee's technical information exchange. There were two special inspections on the followup of licensee reported physical security events (Section IV.G). Also, there were three licensing examination site visits.

C. Investigation and Allegation Review

There were no significant investigations or allegation activities during this assessment period.

D. Escalated Enforcement Actions

1. Civil Penalties

A Severity Level III violation concerning security access control which did not result in a civil penalty was assessed on November 25, 1985.

A Severity Level III violation concerning access control (weapon in protected area) which did not result in a civil penalty was assessed on April 4, 1986.

2. Orders (those related to enforcement)

None.

E. Licensee Conferences Held During Appraisal Period

Enforcement conference held on March 3, 1986, to discuss improper search for a firearm at the access control point.

Management meeting held on March 3, 1986, to discuss licensed operator requalification examination results.

Enforcement conference held on September 26, 1985, to discuss a security incident at Surry.

F. Confirmation of Action Letters

None.

G. Review of Licensee Event Reports and 10 CFR 21 Report Submitted by the licensee.

During the assessment period, there were 57 LERs reported. The distribution of these events by cause, as determined by the NRC staff, was as follows:

Cause	Unit 1	Unit 2	Total
Component Failure	17	10	27
Design	5	1	6
Construction/Fabrication/ Installation	3	2	5
Personnel:			
Operating Activity	3	1	4
Maintenance Activity	3	3	6
Test/Calibration Activity	3	3	6
Other Activity	1	-	1
Out of Calibration	-	1	1
Other	-	1	1
TOTAL	35	22	57

H. Licensing Activities

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

- Multi-Plant Actions (30 complete, 20 in review). Some of the completed actions in this category are:

- Reactor Trip Breakers (B-76, B-78, B-79, B-80, B-81, B-82, B-85, B-87, B-88, B-92)
- Environmental Qualification of Safety Related Electrical Equipment (B-60)
- Reporting Requirements per GL 83-43 (A-18)
- Control of Heavy Loads - Phase II (C-15)
- Steam Generator Review per GL 85-02 (C-16)
- Diesel Generator Reliability Tech Specs per GL 84-15 (D-19)

- TMI (NUREG-0737) ACTIONS (8 complete 14 in review). Some of the completed actions in this category area:
  - Safety Parameter Display System (I.D.2)
  - Small Break LOCA Outline (II.k.3.30)
  - Supplemental Confirmatory Order
  - Procedures Generator Package Review (NUREG-0737, Suppl. 1)
- Plant Specific Actions (36 complete, 34 in review). Some of the completed actions in this category are:
  - Extension for Environmental Qualification
  - Fuel Assembly Reconstitution
  - Adequacy of Station Electric Distribution System Voltages
  - Organization Changes Requested
  - ISI Section Ten Year Interval Unit-2
  - ASME Section XI Relief Requests
  - Tech. Specs. Amendment for Surveillance of Snubbers
  - Tech. Specs. Amendment for RCS Criticality Temperature
  - Amendment for Revised GDC-4
  - Dry Cask Independent Spent Fuel Storage Installation
  - Relaxed k-effective (Refueling)
  - ISI Relief Requests

Significant amendments included:

- Fuel Assembly Reconstitution (TS Sec. 5.3)
- Boron Injection Tank Surveillance
- Reorganization, and Reporting Requirement for 50.72 and 50.73
- Minimum Reactor Coolant Temperature for Criticality
- Maximum Allowable k-effective During Refueling
- TS Amendment for Surveillance of Snubbers
- Amendment for Revised GDC-4

I. Enforcement Activity

UNIT SUMMARY

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	D	V	IV	III	II	I
UNIT NO.	1/2	1/2	1/2	1/2	1/2	1/2
Plant Operations			0/1			
Radiological Controls		2/2	1/1			
Maintenance		1/1	3/3			
Surveillance			2/1			
Fire Protection						
Emergency Preparedness			1/1			
Security			3/3	2/2		
Outages						
Training						
Quality Programs and Administrative Controls Affecting Quality			1/1			
TOTAL		3/3	11/11	2/2		

FACILITY SUMMARY

FUNCTIONAL AREA	NO. OF DEVIATIONS AND VIOLATIONS IN EACH SEVERITY LEVEL					
	D	V	IV	III	II	I
Plant Operations			1			
Radiological Controls		2	1			
Maintenance		1	4			
Surveillance			2			
Fire Protection						
Emergency Preparedness			1			
Security			3	2		
Outages						
Training						
Quality Programs and Administrative Controls Affecting Quality			1			
TOTAL		3	13	2		

J. Reactor Trips

Unit 1

April 29, 1985 - The reactor automatically tripped during shutdown on a turbine trip signal due to a loss of the "A" main feedwater pump. The unit was being removed from service due to primary system leakage and a scheduled maintenance/snubber outage.

August 4, 1985 - The reactor automatically tripped from 100 percent power due to a reactor coolant loop "A" low flow signal to the reactor trip circuitry caused by an operator inadvertently bumping flow sensing lines in loop room.

September 11, 1985 - The reactor automatically tripped on a turbine trip due to inadvertent closure of the condenser inlet valves.

January 7, 1986 - The reactor tripped automatically due to "A" steam generator low level with a feed flow/steam flow mismatch caused by a loss of instrument air due to ice formation in the air dryer.

January 19, 1986 - The reactor was manually tripped due to a dropped jumper cable into the logic cabinet which came in contact with several terminals, initiating a dropping of four control rods and a loss of rod control.

January 24, 1986 - The reactor was manually tripped following turbine rampdown due to a fire in "A" phase bus duct caused by ground straps arcing.

February 7, 1986 - The reactor automatically tripped on turbine trip at 15 percent power due to high water level in "C" steam generator caused by control difficulty of the main feedwater regulating valve.

Unit 2

November 7, 1985 - The reactor automatically tripped on turbine trip at 22 percent power due to high water level in "B" steam generator caused by feedwater control difficulty when the operator shifted the main feedwater control from manual to automatic.

February 16, 1986 - The reactor was automatically tripped from 16 percent power on a turbine trip due to high water level in the "B" steam generator (S/G). Cause of S/G high water level was excessive leakage through the feedwater regulating and the bypass valves. The unit was shutting down for a snubber outage.

May 11, 1986 - The reactor tripped automatically from 100 percent power on a overpower delta T signal following turbine runback. The cause of turbine runback and reactor trip was due to undervoltage in the 2J bus resulting from a failure of the load tap changes on the 'C' reserve station service transformer.

June 17, 1986 - The reactor was manually tripped during unit shutdown when the operators observed increasing water level in the "A" steam generator. Feedwater regulating valve leakage was suspected, contained and repaired.

K. Surry Gaseous and Liquid Effluent Release

Gaseous (curies for two units)

	RII 1985 AV	1/1-6/30/86	1985
Fission and Activation Gases	13140	1939	2067
Iodine	0.30	.02	0.03
Particulate	.0144	.002	.00123
Tritium	760	11.7	32.7

Liquid (curies for two units)

	RII 1985	1/1-6/30/86	1985	1984	1983
Fission Activation Products	1.9	4.5	8.55	9.73	14.5
Tritium	770	596	1090		