UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

Report Nos.: 50-338/88-06 and 50-339/88-06

Licensee: Virginia Electric and Power Company
Richmond, VA 23261

Docket Nos.: 50-338 and 50-339 License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Conducted: March 28 - April 1 and April 11-15, 1988

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SUMMARY

Scope: This was a special announced Operational Performance Assessment (OPA). The OPA evaluated the licensee's current level of performance in the area of plant operations. The inspection included an evaluation of the effectiveness of various plant groups including Operations, Maintenance, Quality Assurance, Engineering and Training, in supporting safe plant operations. Plant management awareness of, involvement in, and support of safe plant operation was also evaluated.

The inspection was divided into three major areas including Operations, Maintenance Support of Operations, and Management Controls. Emphasis was placed on numerous interviews of personnel at all levels, observation of plant activities and meetings, extended control room observations, and plant and system walkdowns. The inspectors also reviewed plant deviation reports and licensee event reports (LERs) for the current Systematic Assessment of Licensee Performance (SALP) evaluation period, and evaluated the effectiveness of the licensee's root cause identification; short term and programmatic corrective actions; and, repetitive failure trending and related corrective actions.

A review of past NRC inspections and reportable events indicated a troubled performance history at North Anna. Weaknesses had been identified in the inservice inspection program, environmental qualification of equipment, procedural adherence, post maintenance testing, and procedure adequacy. Several of these issues involved potential escalated enforcement actions.

During this inspection, the NRC discussed the performance history with plant and corporate management. The licensee's responses to these discussions and the results of the OPA indicate that weak areas had been identified by management and that significant actions had been taken to correct problems in these areas.

Long-term actions included the establishment of a Quality Maintenance Team concept; a substantial procedure rewrite effort; establishment of a Human Performance Evaluation System to systematically review personnel errors and take appropriate programmatic corrective actions; Employee Involvement Teams; and, analyses of the structure of site and corporate organizations including redefining and reassigning responsibilities to enhance operational performance. More recent efforts included additional emphasis on employee awareness of the need to follow procedure; an increased emphasis on individual ownership and responsibility for quality work; additional guidance on post maintenance testing and plans to provide further post maintenance test guidance upgrades; reduction of equipment deficiencies; and new trending programs to evaluate similar deficiencies and identify programmatic weaknesses. The licensee has also added an onsite systems engineering group and plans additions to the maintenance planning staff.

In general, the licensee's programs in the areas inspected were found to be adequate with a number of particularly strong features. Management appears to be taking the appropriate actions to achieve improved performance. Weaknesses were identified in some programs as indicated below. The licensee committed to evaluate these areas and take appropriate actions to enhance performance in these areas. Strengths and weaknesses are summarized below:

Strengths

In the area of Operations, strengths included:

- Control room operators were professional, attentive, and knowledgeable.

- Maintenance coordination and tagging control were conducted outside the control room which greatly contributed to reduced noise levels and traffic flow in the control room.

- Equipment operator rounds consisted of a quantitative tour and a second qualitative tour.

- Operations managers were aware of plant conditions, conducted frequent control room visits and plant tours and were actively involved in day-to-day activities.

- A number of Operations managers held Senior Reactor Operator (SRO) licenses and had an extensive amount of North Anna control room operating experience.

- Housekeeping plant wide was very good.

- Unit labels, color coding of unit procedures, and the new equipment identification program were good.

The following strengths were identified in the area of Maintenance Support of Operations:

- The scheduling and coordination of work activities between Operations and Maintenance appeared to be effective.

- The Quality Maintenance Team (QMT) program appeared to be a good approach toward higher quality maintenance. Maintenance personnel felt the QMT program had increased work quality (but were uncomfortable performing their own Health Physics duties).

- Direct supervision at the job site and and communications between technicians and foremen appeared to be good.

Strengths in the area of Management Controls included:

- The Inspector of the Day program provided quality control review of daily activities.

- Effective and terse management meetings were conducted to evaluate issues. Also, active management involvement in daily activities was observed.

- Managers had supervisors accompany them on tours and took immediate action to correct undesirable conditions.

- Upper management conducted off-hour tours.

- An Employee Involvement Team Program appeared to be effectively involving employees in resolution of plant problems.

- Performance evaluations were conducted on QMT inspectors every six months.

- Human Performance Evaluation System (HPES) reports on personnel error events and corrective actions appeared to be thorough, timely and effective.

- Responsible individuals and supervisors were present to present their items to the Station Nuclear Safety and Operating Committee (SNSOC).

Weaknesses

Weaknesses in Operations included:

- Some control room instruments, such as instruments for normal cooldown using the Residual Heat Removal System, were not in a periodic calibration program.

- Shift turnovers for Shift Supervisors lacked a formalized checklist, allowing for the possibility of incomplete transfer of plant status.

- Shift turnovers for Assistant Shift Supervisors were incomplete due to the failure to review the opposite unit's Assistant Shift Supervisor narrative log book, or Technical Specification action item log.

Weaknesses in Maintenance Support of Operations included:

- There was a backlog of approximately 7800 completed but not closed work orders. The backlog was affecting the maintenance history files used by the planners and the equipment history used for trending of repetitive failures.

- The staffing for mechanical planners appeared to be inadequate to process approximately 600 work orders per month and to close out the backlog of completed work orders.

- Interviews with mechanical foremen and mechanics indicated that work orders issued by Planning were sometimes incomplete.

Weaknesses in the Management Controls area included:

- The Temporary Changes/ Procedure Deviations procedure contained weaknesses in the generation, review, and control of procedure changes. A large backlog of needed procedure changes existed due to weak procedure change processing methods.

- The QMT program had not been assessed by QA since implementation.

- Trending of deficiency reports and work orders were not performed and root cause analyses of equipment deficiencies were not performed in some cases.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*M. Bowling, Assistant Station Manager
*D. Cruden, Vice President, Nuclear Operations
*R. Driscoll, QA Manager, North Anna
*L. Edmonds, Superintendent, Nuclear Training
*R. Enfinger, Assistant Station Manager
*N. Hardwick, Manager, Nuclear Programs and Licensing
*D. Heacock, Superintendent, Technical Services
*G. Kane, Station Manager
*M. Kansler, Superintendent, Maintenance
*R. Harowick, Corporate Manager, Quality Assurance
*A. Stafford, Superintendent, Health Physics
*J. Stall, Superintendent, Operations
*W. Stewart, Senior Vice President, Power
*V. West, Supervisor, Planning
*T. Williams, Manager, Nuclear Training

Other licensee employees contacted included technicians, Operation's personnel, maintenance and instrumentation and controls personnel, and office personnel.

NRC Representatives

*J. Caldwell, Senior Resident Inspector
*L. Engle, Licensing Project Manager
*M. Ernst, Deputy Regional Administrator
M. Shymlock, Chief, Operational Programs Section
*J. Taylor, Deputy Executive Director for Operations (EDO)
*W. Troskoski, Regional Coordinator, EDO
*B. Wilson, Branch Chief, Reactor Projects

*Attended exit interview

2. Exit Interview (30703)

The inspection scope and findings were summarized on March 11, 1988, with those persons indicated in paragraph 1 above. The inspectors described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. Proprietary information was reviewed by the inspectors, however, no proprietary information is included in this report.

Note: A list of acronyms used in this report is contained in paragraph 8.

Item Number	Status	Description/Reference Paragraph
338, 339/88-06-01	Open	VIOLATION - Failure to follow procedure for (1) audits of operator aids; (2) configuration control of the casing cooling system; and, (3) revision of surveillance instruction and abnormal procedure to include Technical Specification revision on Mode applicability for containment pressure - high. (paragraphs 5.a.(7), 5.b, and 5.g, respectively.)
338, 339/88-06-02	Open	UNRESOLVED ITEM - Determination of seismic qualifications for H and J train emergency switchgear cabinets. (paragraph 5.b)
338, 339/88-06-03	Open	IFI - Calibration of control room instrumentation. (paragraph 5.a.(5))

3. Licensee Action on Previous Enforcement Matters (92701)

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items are matters about which more information is required to determine whether they are acceptable or may involve violations or deviations. An unresolved item identified during this inspection is discussed in paragraph 5.b.

5. Operations (71707, 71710, 42700)

The inspectors performed extended observations of control room operations (including back shifts), shift turnovers, and reviewed applicable operator logs. The inspectors monitored Operations personnel performance, awareness of plant status, use of procedures, and the maintenance of required station logs and status boards.

Interviews were conducted with the Assistant Station Manager of Operations and Maintenance (O&M), Superintendent of Operations, Shift Supervisors (SSs), Assistant Shift Supervisors (Assistant SSs), Control Room Operators, Shift Technical Advisors (STAs), and various equipment operators. Random interviews were conducted with operators in the control room and equipment operators during system walkdowns, plant tours, observations of surveillance and post maintenance testing, and tagging and removal of equipment from service.

The inspectors noted that many of the Operations managers hold Senior Reactor Operator licenses with an extensive amount of on-shift time, which greatly contributed to the Operations staff's confidence in management.

a. Control Room and Local Plant Operations

(1) Control Room Demeanor

Control room conduct was a noteworthy strength. Licensed operators were observed to remain within the work area as required by administrative procedure, ADM-19.10, Limitations on Licensed Personnel Movement, dated March 31, 1983, and Regulatory Guide 1.114, Guidance On Being an Operator At The Controls Of A Nuclear Power Plant. All licensed operators were attentive to plant operations and alarm status. The attitude of personnel was consistently professional. Discussions were limited to plant related activities.

Noise levels were low. The licensee had established a control room environment which was conducive to attentive operation of the nuclear units. The licensee had moved the maintenance/planning functions out of the control room which resulted in a quiet control room with a minimum number of distractions. The control room was clean, uncluttered and well organized.

Access to the control room was controlled by administrative procedure, ADM-20.11, Control Room Access, dated March 31, 1983. The inspectors observed that personnel requested permission to enter the work area, waiting out of the way until granted permission to enter. The access control program was very effective despite the absence of any warning sign or physical barrier.

No violations or deviations were identified.

(2) Procedural Compliance

The control room operators were observed performing a number of procedures and evolutions. Licensed and non-licensed operators had been instructed to follow procedures verbatim and if the procedure could not be performed as instructed, a temporary procedure deviation was to be processed and approved in order to accomplish the task. Compliance with this instruction was evidenced when reviewing the large number of temporary procedure deviations contained within the files located in the control room. General weaknesses were noted with the temporary procedure deviation process as noted in paragraph 5.d of this report.

No violations or deviations were identified.

(3) Procedure Terminology versus Control Board Labeling

Procedure 1-AP-20, Operation From The Auxiliary Shutdown Panel, dated January 21, 1988, was reviewed for consistent terminology between the procedure and the auxiliary shutdown panel. The

panels contained all instrumentation required by Technical Specification 3.3.3.5 with the appropriate measurement range. Additionally, all instruments were within the current calibration period, although several were missing current calibration stickers. The following comments were discussed with the licensee. Step 5.9.b of 1-AP-20 directed the operator to adjust the steam generator power operated relief valve (SG PORV) setpoints as required to maintain steam header pressure, however, the instrumentation used was labeled "SG PRESSURE". The procedure did not caution the operator to ensure that the auxiliary feedwater flow controller is set to the 100 percent open position or that the SG PORV controller is set to the 0 percent closed position before placing the local-remote switch into the "LOCAL" position. The inspector noted that the addition of operating bands or setpoints to the remote shutdown panel gages could enhance the implementation of the control room inaccessibility procedure.

No violations or deviations were identified.

(4) Alarm Response

Response to alarms and annunciators by licensed operators was very good. The licensed operators were able to explain conditions associated with all lit annunciators. Upon annunciation of an infrequently received alarm, the licensed operators were observed reviewing the annunciator response procedures, directing the appropriate equipment operator to verify local alarms, and taking corrective action as necessary. The licensed operators appeared to be cognizant of the evolutions occurring in the plant and their potential effect on instrumentation.

No violations or deviations were identified.

(5) Status of Control Boards and Instrumentation

Frequent tours of the control room, including walkdowns of control panels, were conducted by the inspectors. The control boards have very few work tickets outstanding. Work tickets located in the control room are only written for defective switches or meters and not associated components. The licensee was continuing efforts to bring the annunciator panels to a black board condition.

Commensurate with these attempts, a small number of jumpers had been installed to remove annunciators from operation which the engineering staff had determined to be non-essential to the safe operation of the plant and which required final implementation of the associated engineering work request for removal. The

jumpers were controlled by a jumper log, and licensed operators were aware of the specific annunciators in a jumpered condition.

The inspectors noted that although control room operators check strip chart recorders, entering date and time daily, the strip chart time increments were not synchronized with standard time. Synchronization of all strip chart recorders to standard time could enhance plant operations and greatly assist the licensed operators' examination and analysis of plant transients.

Calibration stickers were attached to almost all installed meters, gauges and controllers. However, some of the indicators had no calibration stickers and some existing stickers were either illegible, blank or contained past due dates. The control room operators, when questioned about these discrepancies indicated that they believed that calibration stickers were no longer required to be placed on control room indicators; consequently, the discrepancies were not thought to be significant. In February 1988, an Assistant Shift Supervisor had sent a memorandum to the I&C Supervisor requesting a status of the sticker program. A response to that memorandum was under development during this inspection.

The inspectors noticed that several calibration stickers associated with the Unit 1 Residual Heat Removal (RHR) System, a system required to be operable under the Technical Specifications, had expired calibration dates. The licensee was asked to verify that the indicators were included in a periodic calibration program. The following indicators were submitted for licensee review.

Indicator	Title
FT-132A and -132B	Component Cooling Water Flow Through the RHR Heat Exchangers
TE-149A and -149B	Component Cooling Water Outlet Temperature from the RHR Heat Exchangers
TE-150A and -150B	Component Cooling Water Outlet Temperature from the RHR Pump Seal Coolers
FS-131A and -131B	Component Cooling Water Flow Switch from the Outlet of the RHR Pump Seal Coolers
PT-1402 and -1403	Pressure Transmitters for Automatic Closure of Valves 1700 and 1702 RHR Loop Suction Isolation

TE-1604	RHR System Heat Exchanger Inlet Temperature
TE-1606	RHR System Heat Exchanger Outlet Temperature
PIC-1606	RHR Pump Discharge Pressure
FT-1605	RHR System Flow Returning to Reactor
Ammeter	RHR Pump Motor Current

It was determined that only indicator PT-1402, PT-1403 and FT-1605 were included in a periodic calibration program. The remaining instruments were calibrated only if required following a maintenance repair or replacement effort. Consequently, the instrumentation channels had not been recently calibrated and available records indicated typical calibration dates of 1976 through 1982.

A brief review of other control room indicators revealed that the instrumentation channels for numerous plant systems covered by Technical Specifications were not included in periodic calibration programs. A sampling of this list follows:

Indicator	Title
TI-103A	Charging Pump Lube Oil Cooler Outlet Temperature
FI-105	Auxiliary Service Water Pump Discharge Flow
TI-150A	Containment Sump Temperature
TI-105	Refueling Water Storage Tank Recirculation Temperature
PI-156A	Reactor Coolant Pump A Seal Differential Pressure
PI-121	Charging Pump Discharge Pressure
TI-144	Non-regenerative Heat Exchanger Outlet Temperature
TI-139	Excess Letdown Heat Exchanger Outlet Temperature

PI-138 Excess Letdown Heat Exchanger Outlet Pressure

The licensee indicated that a commitment was made to periodically calibrate only that equipment listed in Regulatory Guide 1.33, Appendix A, Section 8, in a 1981 response to a Notice of Violation (338/81-07-14 and 339/81-08-14). (Licensee letter serial number 385 dated July 10, 1981.) Appendix A was reviewed and the above mentioned systems, including the RHR system, were not listed. However, for the RHR system, plant operating procedures were identified which made use of the RHR indicators. For example, operations procedure 1-OP-14.1, Residual Heat Removal System, dated November 19, 1987, specified in step 4.1.14, that TI-1604 be used to monitor RHR system temperature increase when reactor coolant temperature is less than or equal to 220°F. Additionally, step 4.1.15 contained a note specifying that component cooling water flow through the RHR heat exchangers not exceed 8,900 gallons per minute. This flow rate was monitored on flow transmitters FT-132A and FT-132B. Also step 4.1.16 specifies that TI-149A and TI-149B be monitored to ensure that component cooling water return temperature from the RHR heat exchanger remains less than or equal to 200°F during system heatup. Procedure 1-OP-14.3, Swapping on Restarting Residual Heat Removal Pumps, dated July 31, 1987, required in step 4.1.18 that RHR pump amperes be verified to be normal. Additional procedures may exist that utilize instruments not in a periodic calibration program. For example, an annunciator response procedure would be used to respond to low component cooling water flow through the RHR pump seal coolers. Since flow switches FS-131A and FS-131B are not periodically checked for calibration accuracy, the annunciator might not alarm when required and operator corrective action might be delayed.

These procedural examples were discussed with Operations Department supervisors. The procedural reliance on uncalibrated control room instruments was identified as a weakness. The licensee committed to reevaluate the calibration program and indicated that important control room indicators beyond those listed in Regulatory Guide 1.33 would be included in the periodic calibration program. Decisions on specific indicators would be made on a case by case basis, depending on their importance to safety, usage during plant operations and existing procedural requirements. The reevaluation of the previously identified instrumentation for incorporation into the plant calibration program is identified as Inspector Follow-up Item 338, 339/38-06-03.

No violations or deviations were identified.

(6) Communications

Equipment operators, control room operators, STAs, and the Assistant SSs appear to effectively communicate, remaining constantly aware of the status of the plant at any given time. Interviews with the plant staff indicate that all individuals appear to have a good working rapport within each shift. The plant staff further stated that the Operations management was readily accessible and receptive to their concerns and ideas.

The Operations Superintendent was frequently seen in the control room, where he was able to observe shift operations and readily communicate with the plant staff. Additionally, the Operations Superintendent attempted to meet weekly with the Operations crew in requalification training.

The SSs spent a majority of their time in the Technical Support Center (TSC) controlling the implementation of maintenance activities. The day shift workload on the SS is very demanding. One SS stated that during the day shift, time was typically not available to tour the plant or personally observe control room operations. It should be noted that the TSC is located adjacent to the control room. The SS, however, is frequently in contact with control room personnel via telephone. In light of the SS's day-shift workload involving long absences from the control room, the licensee should evaluate the impact of the SS's ability to direct the licensee response to a transient.

No violations or deviations were identified.

(7) Logs and Records

The inspectors reviewed the jumper log, control room operator log, the Assistant SS log, safeguards operator log, night order log, abnormal status log, and the SS log. The logs kept by the control room operators contained accurate information. It was noted during shift turnovers that the off going control room operator referred heavily to his personal notebook to inform the oncoming control room operator of evolutions and changes to plant status that occurred during his shift. The licensee should review this practice to ensure that the control room operator narrative log contains sufficient and necessary historical plant operating information.

During the review of the control room operators' narrative log, the inspector found uncontrolled sketches which could have been misconstrued as operator aids. Administrative procedure ADM-19.27, Control and Use of Operator Aids, dated October 29, 1986, delineates the requirements for sources of information which are posted to aid operator recall or note an abnormal condition. ADM-19.27 also requires that "audits of the Operator Aid Log index will be conducted each calendar quarter and documented on 1-MISC-31." Miscellaneous Procedure 1-MISC-31,

Quarterly Operator Aid Log Review, dated August 21, 1986, states that "all Operator Aids in the areas of the station will be surveyed on a quarterly basis (staggered one-third of the areas every month)."

Further examination of the operator aid program required audits revealed that the licensee failed to perform the required monthly audits for the first, second, and fourth quarters of 1987 or the first quarter of 1988 as specified in ADM-19.27. This failure to perform the required audits is identified as an example of violation 338, 339/88-06-01. In response to the inspector's findings, the licensee removed the questionable sketches and performed an audit of the entire operator aid program. Several additional minor discrepancies were identified and corrected by the licensee.

(8) Technical Specification Compliance

The licensee utilizes an Action Statement Status Log to control equipment and track Technical Specification action items. Information contained in this book distinguished between those items which actually placed the plant into action statements and those which were "info," serving as a warning to the licensed operators that additional actions may force the plant into an action statement. Review of the log book is accomplished during shift turnover. These methods appeared to provide positive control over plant status.

No violations or deviations were identified.

(9) Shift Turnover Process

The inspectors observed several shift turnovers for various watch stations inside and outside the control room. These turnovers were accomplished efficiently and in accordance with turnover procedures. As part of the turnover routine, each Assistant SS completed procedure MISC-35.2, SRO (Senior Reactor Operator) Shift Turnover Checklist, dated December 22, 1987, for the nuclear unit for which he had supervisory responsibility. Each Control Room Operator (CRO) completed procedure MISC-35.0, CRO Turnover Checklist (Modes 1-4), dated December 22, 1987, for his assigned unit. The checklists contained sufficient information on plant status, parameters, system alignments and abnormalities to ensure that adequate turnovers occurred. The checklists included references to any major surveillances or maintenance evolutions in progress.

Turnover weaknesses were noted in that each Assistant SS completed detailed plant status [illegible] for a single unit while making a more general review of [illegible] site unit's status. While procedure MISC-35.2 adequ[illegible] ed a single unit,

it did not include requirements to review the equivalent logs on the opposite unit including the opposite unit's Assistant SS narrative log book, Technical Specification action item log, and reactor operator narrative log book. Consequently, the potential existed for an Assistant SS to obtain a much less detailed review of the opposite unit. With both Assistant SSs in the control room this would not be a concern. However, one Assistant SS frequently leaves the control room to perform tours and the SS is typically outside the control room. Consequently, short time periods exist during which only one Assistant SS is in the control room. This individual may not be equally familiar with the status of both units. This potentially disadvantageous situation was discussed with the licensee who subsequently committed to broaden the turnover requirements for Assistant SSs to include both units.

Both Assistant SSs reported to a single SS who primarily worked in the TSC. It was noted that the SS did not utilize a turnover checklist. Exchanges of information between relieving SSs was observed and found to be adequate. Typical reviews included the same information contained on procedure MISC-35.2 such as the Control Room Logs, Jumper Logs, and Shift Orders. Although the observed turnovers were satisfactory, the lack of a written turnover checklist for the SS position is a weakness which should be corrected. A comprehensive checklist such as those available for the other operating crew positions, could preclude inadvertent failure to review important plant information prior to assuming shift responsibilities. This concern was discussed with the licensee who subsequently committed to promptly develop and implement a SS turnover checklist.

On-coming shift personnel who are stationed outside the control room gathered for a briefing in the TSC shortly after completing shift turnover. The briefing was performed by the SS. The observed briefings were effective in disseminating shift objectives promulgated in the Shift Orders and the Plan of the Day.

Control room operators, however, did not participate in any formalized shift briefing. Discussions with several control room operators indicated that an operator specific briefing would be beneficial to their understanding of information disseminated in the Shift Orders and the Plan of the Day. The Operations Superintendent felt that operator turnover procedures provided an adequate knowledge of proposed shift activities. Integrated shift performance appeared to be satisfactory.

No violations or deviations were identified.

b. System Walkdowns

Two plant systems, one for each unit, were walked down to assess the adequacy of alignment procedures, housekeeping and configuration control. A Unit 1 system alignment was verified using Operating Procedure (OP) 1-OP-7.10A, Valve Checkoff - Casing Cooling System, dated January 8, 1987. System configuration and drawing accuracy were verified through comparison to drawing 11715-FM-019B, Rev. 5. The drawing and checkoff procedure were determined to be accurate. Procedure 1-OP-7.10A was last completed on February 5, 1988. The latest completed procedure was verified to be completely filled out, initialed where required, and independently verified.

During the system walkdown, performed on April 12, 1988, two discrepancies were identified and both were promptly corrected. The tags for two Recirculation Spray (RS) test connection isolation valves 1-RS-102 and 1-RS-104 were found to be reversed. The valves are similarly configured and located in close proximity to each other. Both valves were closed as required. The tags were promptly returned to the correct valves. No other tagging deficiencies were identified and all other system valves contained legible, easily identifiable tags.

The second identified discrepancy resulted because Casing Cooling Tank recirculation pump 4A suction isolation valve 1-RS-105 was found closed. The valve is required to be open in accordance with alignment procedure 1-OP-7.10A. The discrepancy did not adversely impact the ability to recirculate the Casing Cooling Tank because the 4B pump was operating and the 4A pump was secured. The Operations Superintendent indicated that the valve had apparently been closed on April 9 or April 10 during system troubleshooting. The troubleshooting effort included swapping the operating recirculating pumps and chiller units in accordance with procedure 1-OP-7.10, Casing Cooling Subsystem of the Recirculation Spray System, dated October 20, 1987. The procedure did not require the normally open pump suction or discharge valve to have their positions altered. However, the system operator was aware that discharge check valve 1-RS-106 for pump 4A was stuck open as indicated by work request tag WR 531252 which was issued on October 27, 1987. The operator shut valve 1-RS-105 when he started the 4B recirculation pump to prevent the existence of an undesired recirculation path backwards through the 4A pump and the stuck open check valve. This action precluded the potential for tank bypass flow. However, the change in valve position was not authorized by either procedure 1-OP-7.10 or 1-OP-7.10A. Additionally, the operator did not obtain administrative approval for the alteration as required by the provisions of ADM-14.0, Tagging of Systems and/or Components, dated February 4, 1988. This failure to utilize the provisions of ADM-14.0 to alter the valve line-up required by 1-OP-7.10 and 1-OP-7.10A is identified as an example of violation 338, 339/88-06-01.

A Unit 2 system alignment was verified using procedure 2-OP-7.4A, Valve Checkoff-Quench Spray (QS) System, dated March 19, 1987.

Configuration and drawing accuracy were verified through comparison to drawing 12050-FM-91A, Revision 15. The drawing and checkoff procedure were determined to be accurate. Procedure 2-OP-7.4A was last completed on October 29, 1987. The latest completed procedure was verified to be completely filled out, initialled where required and independently verified.

During the system walkdown, performed on April 12, 1988, two minor discrepancies were noted. One drain valve associated with pressure indicator PI-QS-203 did not have a local identification tag attached. Additionally, leaking drain valve 2-QS-20 did not have a work request submitted. The drain valve had been wrapped in plastic and taped to catch a small amount of contaminated leakage. Apparently the persons identifying the leakage did not initially process a repair request. The licensee submitted a work request promptly after completion of the system walkdown. The discrepancies did not affect system operability.

Equipment operators were assigned to make two rounds of their area of responsibility during the course of their shift. The first round consisted mainly of a quantitative examination of plant parameters within their area of responsibility. The second tour consisted mainly of a qualitative examination of plant equipment. In addition to the system walkdowns, the inspectors accompanied several equipment operators on their tours of the safeguards equipment areas. In general, all operators appeared to be familiar with the equipment, its normal mode of operation and alert to equipment abnormalities.

During the course of touring the Units 1 and 2 safeguards areas, the inspector observed lifting hoists and trolleys located on rails which were attached to the top of the H and J train emergency switchgear cabinets. At the time of the inspection, the licensee was not able to provide analyses showing that the lifting equipment was seismically qualified. This is identified as unresolved item 338, 339/88-06-02. The licensee promptly removed the equipment and began to perform formal calculations. The licensee has been asked to provide the seismic qualification calculations and the plant modification package, which placed the lifting hoists and trolleys on the cabinets, to the NRC. The licensee placed the use of the hoists and trolleys under administrative control requiring the equipment to be removed upon completion of maintenance activities.

While touring portions of the secondary side, equipment operators were observed isolating a portion of the condensate clean-up system. The inspector noted that the operators did not perform the tag out in the sequence specified on the tagging record. This discrepancy was brought to the attention of the Operations Superintendent. Although the activity observed had no safety-significance, the inspector was concerned that tagging may be inappropriately conducted during safety-related tagging. Discussions with the Operations Superintendent indicated knowledge of deficiencies in the tagging

procedure and procedure implementation. The Operations Superintendent provided the inspector with two Quality Control Activity Reports (QCAR) which were issued for lack of compliance with ADM-14.0, Tagging of Systems and/or Components. The corrective action to the QCAR, which had not been completed by the licensee, included a memorandum, to be issued by the Operations Superintendent, which required each shift supervisor to review with operations personnel the subject QCARs and the requirements of ADM-14.0. The Operations Superintendent indicated that the lecture would stress the need for accurate tagging documentation and the importance of proper removal and restoration of equipment.

Items of noted strength observed during the plant tours included the color coding of unit procedures, the numerous signs reminding plant personnel of which unit they are about to enter, and equipment labeling. These items help ensure that plant personnel are working on the correct piece of equipment with the correct procedure.

c. Operations-Maintenance Interface

Maintenance work orders were reviewed to evaluate the adequacy of protective tagging, configuration control, SRO review and approval of functional testing, independent verification and documentation. Operations used Maintenance Operations Procedures (MOPs) to remove and restore major components from service for maintenance. The MOPs referred to Operations Procedures which specified which Performance Test (PT) must be run prior to returning the component to service.

Post maintenance testing (PMT) requirements were specified at various points during the WR and WC process, but final determination for ensuring adequate PMT was made by the Shift Supervisor. A test coordinator was assigned to ensure that valve lineups, periodic testing, predictive analyses, and post maintenance testing were completed prior to each mode change.

PMT requirements and guidance were undergoing revision due to problems identified by the NRC and the licensee. Quality Control Activity Report number AR-N-86-1647 was written in December 1986 against improper post maintenance testing on several components. The QCAR stated that the improper testing indicated a potential programmatic breakdown. After several iterations of correspondence between maintenance and quality assurance groups, the issue was escalated to plant management. The new escalation policy had been implemented recently. Management involved other plant groups and decided to develop and issue a new procedure to control the implementation of post maintenance testing. Procedure ADM-16.19, Work Order/ Maintenance Procedure Test Follower was issued February 29, 1988. The Test Follower supplements existing site maintenance surveillance procedures by defining post maintenance testing activities. Although the Follower appeared to assist the Shift Supervisor in coordinating

testing requirements, the effectiveness of the program could not be evaluated due to the short period of time since implementation.

Open Maintenance Work Order (MWO) 178841 for working on the 1A charging pump was reviewed. The operations test block on the MWO had been improperly marked as not required. This item was pointed out to the maintenance foreman and Shift Supervisor and corrected to reflect that a test was required. The Shift Supervisor was aware of the need for functional testing prior to returning the pump to service. The maintenance procedure used to perform the work did not specify which PT was required. The charging pump operating procedure specified the required PT. Station records were reviewed and the inspector verified that the applicable PT had been run following maintenance on the Unit 1 charging pumps during the past year. Reviews of other completed work orders did not indicate any discrepancies in the completion of PMT requirements.

The licensee was in the process of upgrading maintenance procedures to more clearly specify retest requirements and place the retest requirements in an attachment to the procedure. Approximately 50 procedures have been changed to date.

In summary, the current method used to perform post maintenance testing is cumbersome but adequate to ensure components are tested prior to declaring them operable. Additional emphasis should be placed on upgrading the post maintenance testing guidance.

No violations or deviations was identified.

d. Temporary Procedure Deviations

The administrative program by which temporary procedure deviations are developed and approved, as specified in procedure ADM-5.8, Temporary Changes/Procedure Deviations, dated August 8, 1987, was reviewed and found to be cumbersome. Approximately 50 procedure deviations were reviewed, the vast majority of which were annotated indicating they should be incorporated as permanent procedure improvements. However, the temporary change approvals were generally authorized for a single use only. The repetitive use of a procedure necessitated the repetitive generation and approval of the deviation. Consequently, this method affected the workload of the staff. In addition, the Station Nuclear Safety and Operating Committee (SNSOC) repeatedly received identical deviations for review.

All of the deviations examined were enhancements which did not change the intent of the original procedures or received prior SNSOC review. Consequently, as authorized by Technical Specification 6.8.3, they were initially approved by two members of the plant staff with final review to be performed within 14 days by the SNSOC. Following initial staff approval and prior to SNSOC review, a copy of the deviation is placed with the appropriate procedure in the control

room files. Typically, this copy is not replaced with a final approval copy after SNSOC review and Assistant Station Manager approval. This is a potential problem because the SNSOC retains the authority to make recommendations and comments on the deviation and to promulgate special limitations on its use, as specified in Attachment 1 of ADM-5.8. Consequently, the Operations Department procedure files could contain copies of procedure deviations which do not reflect the SNSOC approved version of the deviation.

A brief review was made to compare previously approved deviations held by the Operations Coordinator - Procedures to those deviations on file in the control room. It was determined that several deviations to procedures 1-OP-5.5 and 2-OP-5.5 were held by the Operations Coordinator - Procedures but were not on file in the control room. These deviations were annotated indicating that they were appropriate for incorporation in a future permanent procedure change. Their absence from the control room files could result in performance of a procedure with previously identified enhancements omitted.

Most of the deviations are marked "permanent change required". These deviations are forwarded for review by the Operations Coordinator - Procedures to be incorporated in a future procedure revision in accordance with procedure ADM-5.4, Processing New and Revised Procedures and Deletion of Procedures, dated March 9, 1988. However, no index of deviations requiring permanent incorporation was maintained. The lack of an index was disadvantageous because approved deviations could be misplaced prior to incorporation. Additionally, verification that all appropriate deviations had been promptly incorporated into procedure revisions was extremely difficult. For example, a deviation was approved on August 4, 1986, and marked "permanent change required" for procedure 2-OP-3.3, Unit Shutdown From Hot Shutdown Condition (Mode 4) to Cold Shutdown Condition (Mode 5) at 200 Degrees Fahrenheit. The procedure was revised in September 1986 but the deviation was not incorporated into the revision. As of March 30, 1988, a copy of the deviation remained in the control room file. The deviation was either missed during the procedure revision or remained in the control room file long after a decision had apparently been made not to incorporate the change into a permanent procedure revision.

The lack of a deviation index precluded an accurate quantitative analysis of the backlog of procedures requiring revision. A review of the control room procedure file, the I&C Department procedure file, and the file maintained by the Operations Coordinator - Procedures indicated that a substantial backlog existed. The licensee had identified the backlog concern prior to this inspection. The Operations Coordinator - Procedures had been designated as the Site Coordinator - Procedures, a newly created position, for the purpose of better managing the procedure change process. The

centralization of the change process should improve efficiency and reduce the backlog.

Another potential weakness of ADM-5.8 was that deviations were not evaluated for applicability to both units when initially approved. Consequently, the control room file for Unit 2, procedure 2-OP-5.5, Filling and Venting the Reactor Coolant System With One or More Loop Isolation Valves Closed, contained 3 "permanent change required" deviations, none of which were included in the Unit 1 file. Similarly, Unit 1 procedure, 1-OP-5.5, contained a deviation which was not in the Unit 2 file.

The review process for the deviations was also identified as containing weaknesses. Presently, the staff members have no checklist to use in determining if a proposed change constitutes a change to the intent of the original procedure. A generalized definition of "change of intent" is contained in ADM-5.8. The procedure does not require applicable sections of the Technical Specifications and Final Safety Analysis Report be reviewed prior to determining if a proposed deviation effects the intent of a pre-existing procedure. Additionally, proposed deviations are not evaluated to determine whether they change acceptance criteria, modify hold points, decrease fire protection effectiveness, modify independent verification requirements, change setpoints, or decrease the effectiveness of the emergency plan. The licensee has previously recognized weaknesses in ADM-5.8 related to defining intent changes and a revision is under development.

The weaknesses identified in the procedure change program were discussed with the Operations Superintendent. Prior to this inspection the licensee had developed and was reviewing a proposed revision to ADM-5.8. The licensee committed to evaluate the inspection teams comments relative to procedure deviation control and to seek additional information from industry sources. Appropriate modifications would be included in a revision to ADM-5.8 which was scheduled for issuance on May 1, 1988.

Additionally, a complete audit of the control room procedure files was initiated to ensure that all appropriate previously approved deviations were available to the staff. Any deviation copy which did not reflect SNSOC review and management approval would be replaced with a copy reflecting the approval.

No violations or deviations were identified.

e. Surveillance Testing

Selected surveillance tests were reviewed and/or witnessed by the inspector to ascertain that current written approved procedures were available and in use, that test prerequisites were met, that system

restoration was completed and that test results were adequate and in compliance with applicable Technical Specifications.

The following tests were either reviewed or witnessed. Tests witnessed are identified by an asterisk.

*1-PT-213.3, Valve ISI (Containment Atmosphere Clean Up System)
*2-PT-64.4A, Casing Cooling System 2-RS-P-3A
*2-PT-64.4A.1, Casing Cooling Pump Bearing Temperature
*1-PT-82.2B, 1J DG Test (Simulated Loss of Off-Site Power)
1-PT-14.2, Charging Pump Test 1-CH-P-1B.

Surveillances observed by the inspectors were performed in accordance with procedures and in constant communication with the control room staff. Prior to the performance of 1-PT-82.2B, an infrequently performed test, a pre-test briefing was held to review all required actions and desired responses.

It was noted that operators were signing prerequisites for verifying systems lined up per OP-1A, Pre-Start-Up Checkoff List, based on personal knowledge of system conditions but without actually looking at the completed copy of OP-1A. The licensee committed to issue guidance to Operations personnel with respect to what actions are required to verify this specific prerequisite.

Examination of the Diesel Generator test file led to discussions with the Superintendent of Technical Services on the subject of the licensee's implementation of Regulatory Guide 1.108, Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants, as committed to by the licensee in their Technical Specifications. The licensee was in compliance with the provisions of the Technical Specifications and Regulatory Guide 1.108. The inspector noted that the licensee performs post maintenance testing separate from the operability testing. Post maintenance testing which results in a failure is not considered a valid failure if the failure was caused as a result of the inability to correct the original problem. Failures as a result of unrelated problems, however, are considered valid failures.

No violations or deviations were identified.

f. Overtime

The use of overtime by Operations was reviewed to ensure compliance with NRC guidelines and Technical Specification limits. NRC guidelines on work hours include Generic Letters 82-12 and 82-02. The generic letters note, "in the event that unforeseen problems require substantial amounts of overtime to be used, or during extended periods of shutdown for refueling, major maintenance or major plant modifications, on a temporary basis," that specific guidelines should be adhered to. These guidelines include extended

work hours up to 72 hours in a seven day period. The generic letters also recognize "that very unusual circumstances may arise requiring deviation from the above guidelines, such deviation shall be authorized by the plant manager or his deputy, or higher levels of management."

The licensee's administrative procedure, ADM-20.3, Hours of Work, dated November 5, 1987, was reviewed and found to adequately implement NRC guidelines in this area. Review of the licensee's "Deviation from Maximum Work Hours" records for 1987, however, indicated that the maximum guidelines were exceeded by Operations personnel approximately sixty times. The majority of the deviations were for exceeding 72 hours in seven days during outages and peak vacation periods. The frequency of exceeding the maximum work hours in 1987 indicates that overtime is being authorized quite often. The licensee stated that operators were not removed from training or required to work on their days off in order to prevent other operators from exceeding the overtime guidelines. The licensee stated that the overtime deviations were utilized to support vacations and outages. Records for 1988 up to April 11, 1988, indicate that the guidelines were exceeded four times.

No violations or deviations were identified.

g. Review of Abnormal Operating Procedures

The inspector reviewed five abnormal operating procedures. The following discrepancies were noted.

Abnormal procedure AP-3, Loss of Vital Instrumentation, dated May 15, 1988, was established by the licensee to implement the action statements for inoperability of, among other instrumentation, containment pressure - high. The action statement for containment pressure - high in Technical Specification Table 3.3-3 required that an inoperable channel be placed in the tripped condition within one hour for operation to proceed. The inspector noted that the Mode applicability of the procedure was only for Modes 1, 2 and 3. Technical Specification 3.3.2.1 required containment pressure - high to be operable in Modes 1, 2, 3 and 4. The inspector determined that Technical Specification 3.3.2.1 had been revised to include Mode 4 for containment pressure - high in Amendment Nos. 84 and 71, issued on August 25, 1986. Further review showed that in addition to the AP, the 12-hour surveillance procedure for containment pressure - high, LOG-4, Control Room Operator Log, had also not been changed to include the Mode 4 applicability. Technical Specification Table 4.3-2 required a channel check every 12 hours for containment pressure - high. The failure to revise the AP and the surveillance procedure to include Mode 4 applicability for containment pressure - high is identified as an example of violation 338, 339/88-06-01.

Review of AP-4.2, Malfunction of Nuclear Instrumentation (Intermediate Range), dated May 1, 1988, indicated that step 5.3.4 was in error in that the step directed the operator to jumper out only source range channel N32 if either of the intermediate range detectors failed. The objective of the section was to ensure that both source range detectors were disabled in the event a second intermediate range detector failed and, therefore, avoid actuating the source range detectors at high power levels. An additional discrepancy was observed in that the note after Step 5.1.1, stated, "Do not pull source range instrument fuses," yet step 5.5.3 provided directions to return the source range fuses if they were pulled. The licensee indicated that the procedure would be corrected.

The inspector also noted that various APs have actions tied to Technical Specifications that specify specific time frames for the action to be performed. The APs do not, however, provide the time limitations. An example of this is AP-1.2, Continuous Rod Insertion, dated August 27, 1986, step 5.4, which directs the operator to verify reactor coolant system temperature greater than 541°F yet does not include in the "response not obtained" that the plant is to be placed in Hot Standby if temperature is not restored within 15 minutes. The inspector recommended that the procedures be reviewed to determine if this information should be added to aid the operator in meeting the Technical Specification time requirements.

The licensee's attention is also directed to an April 27, 1988, letter from C. A. Julian, NRC, to W. L. Stewart, Virginia Power, which indicated that deficiencies existed in AP-33, Reactor Coolant Pump Seal Failure. AP-33 was written such that the operator could not comply with Step 5.2 and could transition out of the procedure prior to tripping the reactor coolant pump with the failed seal. Two operating procedures were also noted to be deficient. In addition to these items, the examiners subsequently determined that procedure AP-22.7, Loss of Emergency Condensate Storage Tank, did not contain provisions to fill and vent the firemain when the firemain is used to supply auxiliary feedwater. The inspectors verified during the OPA that the license was also aware of the deficiency in AP-22.7 and that the procedure was corrected.

The licensee indicated that the APs were being reviewed and reformatted into the standard emergency operating procedure format in the procedure upgrade program. These findings indicate that additional attention to detail is warranted during these reviews.

6. Maintenance Support of Operations (62700, 62702, 92700)

The inspectors reviewed station administrative controls; conducted interviews with workers and supervisory personnel; and reviewed work packages, work requests, deficiency reports, the maintenance planning process, the maintenance backlog and the preventive maintenance program to ascertain whether the licensee was implementing an effective program

relative to maintenance activities. The review included the maintenance organization work procedures, maintenance programs and the interface with Operations. Interviews were conducted with maintenance supervisors, the planning supervisor, planners, the Operations Maintenance Coordinator (OMC), and a number of craft men, foreman and supervisors in the mechanical, electrical, and instrumentation and controls areas. Interviews indicated an overall good knowledge and understanding of maintenance duties and responsibilities.

There have been continuing improvements in the corrective maintenance program at North Anna such as the procedure rewrite program, Quality Maintenance Team (QMT) training and increased management attention in completing corrective maintenance. The coordination of work activities between Maintenance and Operations appeared to be very good. Planning, work history, repetitive failure analysis and root cause analysis were considered to be areas of weakness and are being adversely affected by the large number of completed but not closed work orders. The QMT program had been initiated prior to the end of the last SALP period. The QMT program appeared to be a good program, however, the instrument and controls and electrical crafts had not completed training. The history of events during the SALP period indicated problems in the maintenance area, however, it appeared that increased management attention had been placed on improving the quality of maintenance.

a. Planning Process

Administrative procedure ADM-16.7, Corrective Work Orders, described the program for processing maintenance work requests including identifying, prioritizing, authorizing, scheduling, assigning and documenting associated activities. Work requests were processed and approved by the OMC. Work orders were then generated by the various maintenance planners.

The corrective maintenance process could be initiated by any site employee. The work request form was a two part form. The upper section was attached to the defective equipment and the bottom section was forwarded to the OMC. Plant walkdowns and review of deficiency reports indicate that the licensee was very efficient in identifying equipment deficiencies.

The OMC screened all work request (WR) forms for accuracy and completeness. Additionally, the OMC completed the WR form by assigning priority, plant mode and some of the post maintenance testing requirements. The work request was then entered into a maintenance computer program and the following day the OMC verified that the WR form was properly entered into the maintenance computer program and approved the work request.

Next, the planning department reviewed the various WRs listed in the maintenance computer files. The various disciplines in planning determined responsibility, assigned lead trade and generated a work order (WO) for each WR. The individual planners placed the assigned WO in the lead trade planner's file who assigned the WO a title and added a brief job description. Approximately 50% of the time, the planner would go into the plant and review the WO to ensure correctness in job description, component, train, location and type of deficiency. If practical, the planner would then review and list appropriate prints and schematics, component work history, suggest procedures to be used, and verify availability of parts for repairs. If a Radiation Work Permit (RWP) was required the planner also requested Health Physics assistance in advance to prevent delays.

There were various programs used to coordinate maintenance activities. The plan of the day (POD) listed those maintenance activities that were to be performed during the course of the day. The POD was used as a notification to the maintenance organizations and Operations that various systems or components were to be worked. There was a daily, 11:00 a.m, planning meeting where operational needs were discussed. A weekly maintenance schedule was reviewed and approved by the planning department and this scheduling document was issued to coordinate work activities with the Operations Department's periodic test schedule. There were also bi-weekly Electrical, Mechanical and Instrument planning meetings to coordinate the upcoming maintenance and preventive maintenance items with Operations; resolve work orders on hold; and, call attention to overdue maintenance. The OMC also maintained a list of Operation's "Ten Most Wanted Maintenance Items" which aided in scheduling needed maintenance activities. At the scheduled time, the WO was forwarded to the appropriate maintenance foreman, the maintenance was performed and the WO was sent back to the planner. The planner reviewed the completed WO, placed the appropriate data in the equipment history file, and transferred the completed WO to the vault for permanent record retention.

The scheduling of maintenance items and the maintenance interface with Operations was not a problem and appeared to function adequately. The OMC was an SRO licensed individual that directly interfaced with the Maintenance Planners and Operations Shift Supervisor. This greatly enhanced the licensee's ability to schedule maintenance items.

It was noted during the inspection that an extremely large number of completed WOs had not been reviewed by the maintenance planners and also the WO data had not been entered into the equipment history files. The backlog had been in the 8000 to 10,000 range for all disciplines for the last six months. It was noted that approximately 600 WRs were submitted to the mechanical maintenance planners per month for review and processing. This workload had been effectively

overloading the mechanical maintenance planners. Another effect of the large backlog of completed WOs was the inability to track repetitive failures since the equipment history files were not up-to-date.

The inspection team observed that due to the large workload of the mechanical planners, that the WOs sent to the field did not always contain all of the needed data such as complete job steps, procedures, tools, drawings or technical manuals. Interviews with maintenance mechanics and mechanical supervisors also indicated that when a WO was issued from planning, the planning process was often not completed. Work packages received from the Planning Department were considered to be good for I&C and electrical, however, the mechanical work packages were lacking. Various foremen stated that they had to identify appropriate procedures, technical manuals and prints. The mechanics further stated that they felt the procedures were only 70 percent effective.

The licensee had implemented a number of items to assist in the planning effort. Two contract planners had been added to the staff within the last year. An additional clerk was hired by the mechanical group to assist in completed package preparation prior to forwarding to planning. Two crafts foremen (one Mechanical and one Electrical) had been hired by Planning to assist in the planning effort. Planning had established a two week review cycle for WOs that have been planned but not performed. Craft, Operations, and Planning supervision participated in scheduled debriefs of incomplete work and these discussions impact planned work.

Overall, the program for planning work activities appeared to be adequate. The coordination and scheduling activities between Operations, Maintenance, Health Physics and other support organizations appeared to be very good. Weaknesses in the planning process included the large backlog of completed but not processed WOs, the lack of trending, the staffing of mechanical planners, and incomplete work packages issued to the field by Planning. Actions being taken by the licensee should be effective in resolving these weaknesses.

No violations or deviations were identified.

b. Work Orders

Selected open and closed work orders (WO) were reviewed for adequacy, detail, authorization, post maintenance testing, procurement, housekeeping, QA/QC review, root cause identification and closeout inspection. Approximately 40 work orders were reviewed.

Work orders that were generated by the planning department were forwarded to the maintenance foremen. Maintenance foremen indicated that they often added additional information to complete the work orders prior to performance. The completed work orders reviewed were adequately detailed, identified appropriate procedures in most cases, identified problems and locations, and the job was properly prioritized. The only area that appeared to need more detail was in providing identification of drawings and technical manuals. Procedures appeared to be adequate to ensure that post maintenance testing was performed prior to returning the equipment to service, however, referencing from one procedure to the next was cumbersome. A section titled, Post Maintenance Check/Testing, was included in certain work procedures and provided for work area cleanup, tag removal, Shift Supervisor notification, RWP clearance, and post maintenance test completion.

The Quality Maintenance Team (QMT) concept, discussed in paragraph 7.d, appeared to have been fully implemented in the Mechanical Maintenance Department where the quality control functions were performed by QMT trained individuals. QC personnel were still utilized for various hold points in Electrical and I&C Procedures. QC also performed a random cursory review of completed work order packages. Independent verification was performed as required by various qualified individuals. The processes controlling QC hold points, QC review, and independent verification appeared to be adequate.

The inspectors noted that documentation of root cause for component failures was not specific, was not always clear, and in some cases was missing. A working program for tracking repetitive failures and subsequent root cause analyses for the failures was a weakness because of the large backlog of completed WOs that have not been entered into the history files.

Overall, work order packages appeared to adequately document work activities. Documentation of post maintenance testing and root cause analysis were areas where added management attention was warranted.

No violations or deviations were identified.

c. Preventive and Predictive Maintenance

(1) Scheduling

Scheduling was done by a maintenance scheduler, who made a weekly coordinated schedule each Thursday for all planned maintenance to be done during the next week (Friday to Friday). This schedule included performance tests (surveillances), preventive maintenance, and corrective maintenance. Mechanical, electrical, and instrumentation areas were all included and the scheduling was done with the aid of a computer system. Then the weekly schedule was printed out in two formats, by foreman/maintenance crew assignments and by equipment/system.

The weekly schedule included an estimated 10% overload for each foreman and maintenance crew, to allow for possible job deferrals due to unforeseen holdups with parts, Operations, etc. Also a list of minor maintenance items (no work request required) was used for fill-in work.

The weekly maintenance schedule was reviewed and modified daily at the morning maintenance POD meeting. This meeting was attended by supervisors from mechanical, electrical, and instrumentation maintenance and also Operations and Health Physics. Overall, scheduling of maintenance appeared to be very well organized and conducted and is considered to be one of the licensee's areas of strength.

(2) Scope

The scope of the preventive maintenance (PM) program for mechanical and electrical areas appeared to be adequate. In 1987, system walkdowns by contractors were done to identify all equipment and make PM program additions. As a result, about 30 PMs were added and many BOP components (including approximately 1500 manual valves) were added. Additionally, the PMs are under continual review for updating, readability, initial conditions, and post maintenance testing. In 1987, approximately 200 PMs were revised.

The scope of instrumentation PMs did not appear to be as complete. Many supplemental gages for Technical Specification equipment or balance of plant equipment were not included in the PM program. For example, the calibration program did not include some control board gages. This concern is discussed in paragraph 5.a.(5) in more detail.

(3) PM Adjustments

PMs are routinely reviewed for both scope and frequency. Change recommendations come from Maintenance and Operations, OERs, design changes, and predictive analysis. The predictive maintenance includes oil analysis, vibration measurements, and motor operated valve analysis and testing (MOVAT). A checkmate check valve testing program is planned. Based on predictive maintenance, about 20 changes in PM frequency were made in 1987 and about 10 changes in PM frequency were made based on Maintenance or Operations recommendations. Repetitive failures of machinery have not been well trended in the past and have not been a substantial factor in adjusting PM frequencies. In one case, the hydrogen and oxygen analyzers for the Waste Gas Decay Tank (WGDT) were known to be affected by summer temperatures.

During the months of April-September, they would predictably drift out of calibration. However, no licensee action had been taken to increase the PM frequency on these safety-related instruments. The licensee committed to an increased PM frequency on these hydrogen and oxygen analyzers. Also, the licensee expressed plans for improved trending of Deficiency Reports and machinery failures.

(4) Overdue PMs

The handling of overdue PMs appeared to be adequate. Any overdue PMs were so identified, and constituted less than 10% of all PMs scheduled for the month. The overdue PMs were highlighted in weekly and monthly reports, and appeared to be aggressively pursued.

No violations or deviations were identified in this area.

d. Work Order Status

Work orders/requests were prioritized during staff meetings. Identified non-Technical Specification related work is merged with TS related work during these meetings. The daily meeting participants were supervisory level with the OMC chairing the proceedings. The Planning Department provided information on material availability and existing and projected work schedules. Equipment was returned to service based on operational needs.

Work order (WO) backlog for emergent work was not significant. Overall, the three major departments (Instruments and Controls, Electrical, and Mechanical) trending showed a slight decline for WOs. The number of safety-related WOs that had not been processed by the planners was approximately 1700. These numbers did not reflect WOs that had been completed but not reviewed. This backlog is discussed in paragraph 6.a.

A problem with voiding WOs was identified by the NRC in earlier inspection findings and by the licensee. The licensee had changed the review process and the planners indicated that, at the present time, it was very difficult to void any work order if the work was not done. It now appears that many of the approximate 1500 WOs voided during 1987 were worked under other work orders such as previously scheduled preventive maintenance items. An example of cancelled WOs are valve repackings. The licensee stated that a large number of scheduled repackings were voided due to difficulties with a contractor who was to perform the work.

No violations or deviations were identified.

e. Training

Qualifications for performing the various assigned maintenance activities were obtained by "on-the-job training (OJT)." After performing a given task, a least one time, with a qualified individual, the maintenance technician was signed off by his supervisor as qualified to perform the task alone. Technical training was being given on and off site in specialized areas. A QMT class covering welding was attended by an inspector. The instructor was well-prepared and knowledgeable; and, training materials and course content appeared excellent. The only retraining noted was general employee training.

No violations or deviations were identified.

f. Management and Work Controls

Direct supervision appeared to be good in that at least once per shift the foreman would visit each job site to inspect work in progress. There also appears to be good communications between the technicians and foremen. Overtime did not appear to affect work quality. Minimum overtime is worked during non-outage periods and overtime during outages is regulated by administrative procedures to 16 hrs/day not to exceed 50 hrs/week.

Various maintenance superintendents were interviewed in regard to individual goals, ongoing improvements, planned improvements, staff training, and identified weaknesses. The following goals were identified during the interviews:

- Limit contractors on site
- Improve public perception
- Enhance safety
- Reduce minor injuries
- Eliminate repeat findings
- Reduce NRC violations to less than the Region II average
- Reduce man-rem
- No reactor trips caused by maintenance personnel
- Reduce non-outage corrective WOs to less than 500
- Meet all commitment due dates

Ongoing improvements included:

- More Quality Maintenance Teams
- Reduced use of contractors
- Improved plant material conditions
- Improved plant housekeeping

The licensee noted that the following improvements had been made in plant material conditions:

- Steam leaks were being reduced by replacing old packing with a new style of graphite packing (Chesterton) and by use of live loading packing on selected valves such as the MSIVs.

- Body to bonnet leaks were being reduced by ensuring use of proper gaskets, using more graphoil type gaskets, and insuring proper torquing of bonnets.

- Communications between North Anna and Surry maintenance departments were improving because of monthly conferences with corporate support organizations

No specific problems were identified in material availability and control, however, mechanical technicians stated that they had to return incorrect materials to stores about 20 percent of the time and the I&C technicians stated that they had to return incorrect materials about 15 percent of the time. Parts return was for various causes. The inspector examined a sample of documentation of completed work, but found no case where incorrect parts were installed in the plant. This issue was brought to the attention of licensee management. An additional problem in obtaining parts was that some parts had to be ordered one day in advance from the store house. This sometimes caused delays in returning equipment to service and loss of man-hours due to waiting for parts.

Maintenance staffing levels were not perceived to be a problem with the exception of the Planning Department which appeared understaffed in the Mechanical Section. The need for additional personnel adequately trend deficiency reports and WOs and to perform root cause analyses had been recognized by the licensee. Addition of a full time maintenance engineer for maintenance trending and root cause analysis was planned. Eleven systems engineers were to be added to the technical support staff. The specific duties of the maintenance engineer or the systems engineers had not been determined at the time of this inspection.

Repetitive problems identified by the technicians were failures of the Boric Acid pump seals, charging pump seals, high pressure drain pump seals and steam traps. Maintenance management was aware of these problems and were taking actions to improve reliability of this equipment.

No violations or deviations were identified.

g. Maintenance Procedure Review

Maintenance procedures have been undergoing major revisions. Complete procedure rewrites are being performed by contract personnel. The maintenance group had established a new policy with

regard to writing /rewriting procedures. Craft personnel are involved in the procedure revision process. The licensee stated that this policy stemmed from problems with rewritten procedures generated by the procedure group solely. The organization and management of the procedure rewrite group has also been changed. The inspectors examined one of the procedures, MMP-P-RC-1, Reactor Coolant Pump (RCP) Seal Inspection, which had been rewritten by the procedure group in the recent past and had been worked in January 1988. The RCP seal procedure was deviated (required change) nineteen times during the course of work which was a high number compared to previous seal work using older procedures. The inspectors reviewed a procedure group rewrite (draft) of the RCP seal procedure prior to the craft's review (the new policy had not been implemented). The inspector noted three major points that had not been incorporated into the draft from the previous deviations. The licensee committed to include the points.

Just prior to this inspection, the licensee had made the decision to rewrite the major pump procedures in time to support an October 1988 outage. Forty-four procedures, affecting 250 pumps, were included in the rewrite. Craft input for the procedure revisions was planned.

Maintenance personnel considered many maintenance procedures to be ineffective due to being generic and requiring "write in" steps to accomplish specific tasks. The "write in" steps of the procedure could be generated at the job site, by a task qualified individual, who was qualified based on "on the job training". The procedure did not receive any further review until after the task was completed. During the review of completed procedures in the various work packages it was noted that "write-in" procedural steps were used. Although no "write-in" steps were found that made intent changes to maintenance procedures, administrative instructions did not appear to be sufficient to prevent the use of "write-in" steps to change the intent of the procedure. The licensee committed to enhance the guidance on the use of "write-in" steps.

Another problem identified by maintenance personnel was that individuals at different levels of the craft were allowed to sign-off steps as "Not Applicable." The licensee should review this practice to assure proper controls are in place.

No violations or deviations were identified.

h. Review of Licensee Event Reports (LERs) and Deviation Reports (DRs)

Licensee's LERs for events that occurred during the SALP period were reviewed. From those, a total of six LERs were selected for further inspection effort. Two involved maintenance personnel errors and four others involved machinery failures. In addition, licensee's DRs were reviewed. From the DRs, two cases of repetitive equipment failures were selected for inspection. The inspectors reviewed the documents to determine the adequacy of the licensee's investigation, corrective actions, and reporting.

(1) Unit 2 LER 86-14 involved a temporary jumper, placed in accordance with an I&C maintenance procedure, which fell off resulting in a reactor trip. Human Performance Evaluation System (HPES) Report 86-117, issued approximately two months after the LER, documented a thorough review of the incident. The HPES report made three recommendations to management. Two of the recommendations had been implemented and the Licensing Department Commitment Tracking System (CTS) was tracking the third action until completed. Overall, the licensee's investigation and corrective actions following this LER appeared to be thorough and timely. The HPES reports receive further management review and distribution through the corporate Operational Experience Review (OER) system. HPES was considered by the inspectors to be a licensee strength.

(2) Unit 2 LER 87-018 covered an inadvertent 2J Emergency Diesel Generator start during an electrical maintenance undervoltage periodic test on the 2H emergency bus. An electrician had inadvertently entered a test signal in the wrong test cabinet. A thorough HPES evaluation was conducted, and HPES Report 87-173 was written. This report included six recommendations to management. Completion of these items was being tracked by the commitment tracking system as an HPES commitment, however, in this case, the CTS incorrectly showed the LER as being completed and ready for NRC closeout.

The licensee stated that plans existed to change the CTS this year, to make it a more effective management tool. The current CTS tracked commitments by category: i.e., LER, NRC Bulletin, INPO SOER, HPES report, etc. A particular issue was often implemented by several different commitments, but the CTS had no cross reference and could not be sorted by issue. As a result, an issue could be tracked under one or several commitment categories. To avoid duplication, this LER was closed out and the followup corrective actions tracked under the HPES report number. In the LER, the licensee made a commitment to the NRC to conduct an HPES investigation and to implement corrective actions. Since these actions were not completed, the LER corrective actions were in fact not completed or ready for NRC closeout. The change to the CTS should correct the problem of ability to show the correct status of each commitment.

(3) Unit 1 LER 88-022 of January 8, 1988, described a manual trip of the reactor due to the simultaneous loss of all three circulating water pumps. A similar simultaneous loss of all three circulating waters pumps had also occurred in August 1987. Although the circulating water pumps are not safety related, their total loss challenges the plant protection systems, requiring a manual reactor trip.

After the August 1987 occurrence, an engineering review could not determine the cause. However, a potential cause was identified to be the CW system protection circuitry. In the circuitry, the opening of one of two condenser waterbox vacuum breaker valves on two of four waterboxes will trip all CW pumps. No report was written on this investigation. The LER indicated that, to prevent recurrence, an evaluation would be done to determine if surveillance on the CW system protection circuitry could identify actual and potential equipment failures. This commitment is tracked in the CTS, with a scheduled completion date of August 1, 1988.

The inspectors found that the CW system protective circuitry and vacuum breakers are not included in any regularly scheduled surveillance, preventive maintenance, or calibration program. Additionally, inspectors found that many balance of plant non-safety systems similarly have no preventive maintenance done on instrumentation and control circuits. The licensee stated that they plan to test and evaluate the CW system interlocks during the upcoming outage.

(4) Unit 2 LER 86-002 covered a reactor trip while in Mode 3 (hot standby) following a normal plant shutdown. When the source range detectors energized, as designed, both detectors spiked high causing the reactor trip. The detectors were replaced with new ones and an investigation into the cause of the detector failures was conducted. The root cause of the failures was not determined. The LER was then closed out in the CTS.

In the investigation report these possibilities were presented for the failure cause:

a) Detectors came into service at overrange.
a) Electrical surge to the detectors.
a) End of expected life of the detectors.

With regard to the life of the detectors, a statement in the investigation report was made that "due to the frequency of detector replacement, a valid operation time cannot be determined." Since the licensee maintained records of detector installation and plant operating history, this statement did not seem to make sense. As for the possibility that the detectors came into service at overrange, the LER stated that the source range detectors came on as designed and intermediate range detectors (which generate the signal to energize the source range) were correctly compensated to read accurately. In summary, each of the possible causes listed in the report were inadequately followed up or analyzed in the report. The inspectors found that the author of the investigation report had been a chemical technician who had been newly assigned to the Safety Engineering Department. The licensee stated that engineering investigations, as committed to be done in LERs, are now done by engineers.

(5) Unit 2 LER 87-002 described an event where, with the plant at 100 percent power, the 1C charging pump discharge check valve stuck open following pump shutdown. This resulted in the loss of charging and seal injection flow due to the backflow through the 1C pump. The cause of the check valve hanging open was found to be excessive grit in the hanger bracket bushings which were subsequently replaced. The discharge and recirculation check valves on the Unit 2 1B charging pump and on Unit 1 1C charging pump were tested using the MOVATs checkmate system, and did not reveal any indications of valve degradation. Further corrective action to be taken included development of a PM program for check valves used in critical applications, and development of an Abnormal Procedure for loss of seal injection and charging flow.

The abnormal procedure commitment was tracked in the CTS under the LER. The PM program commitment was tracked in the CTS under INPO SOER 86-03. The LER stated that a similar event occurred on the same valve on March 24, 1986. On that occasion, a work request was submitted but the work order was cancelled because the valve appeared to function properly after being seated.

In interviews with mechanical maintenance supervisors who had been at the plant for many years, the inspectors were told that the grit in the valve was an isolated occurrence. No similar grit had been seen elsewhere in the charging system, during various inspections. This LER did not seem to adequately describe followup concerns or inspections for grit elsewhere in the system, nor did it seem to fully discuss followup testing of all other check valves in the system. It appeared to the inspectors that a more thorough followup engineering investigation of this event should have been done.

(6) Unit 2 LER 87-012 reported a failure of Type "C" local leak rate testing by three containment isolation valves. These valves provide isolation for the condenser air ejector discharge when it is diverted to the containment.

This LER was submitted later than the required 30 days from the time of the event (event date August 31, 1987, LER date October 14, 1987). The stated reason for report lateness was procedure inadequacy. The acceptance criteria for the procedure did not require a deviation report for "as found" leak rate greater than the required limit of 0.60 La. Also, the LER did not contain a licensee contact name and telephone number.

The engineering investigation report that was done subsequent to this LER found that the cause of valve leakage was not debris, as stated in the LER, but instead was an incorrect testing method. Pressure had been injected between two valves in

series, which tested one from a direction in which it was not designed to hold the test pressure. A corrected test method was used and the valve did not leak. The inspector found this analysis acceptable, except for one point. If the testing procedure was faulty, how did this valve pass previous Type C testing? The licensee investigated this, and found that on the previous test, the same failure had occurred. An engineering analysis had been done, and a temporary change to the test procedure had been written. Apparently, since then the procedure had not been permanently changed and the temporary change had been lost. The use of temporary changes to procedures, instead of needed permanent changes, was found to be an overall area of weakness for the licensee, and is discussed in paragraph 5.d.

Rev. 1 to this LER was issued to cover the results of the engineering investigation and the revision of the test procedure. Based on this onsite inspection, Unit 2 LER 87-012 Rev. 1 is closed.

(7) A review of the DR log revealed a series of repetitive failures of oxygen and hydrogen analyzers for the Waste Gas Decay Tank (WGDT). The safety function of these monitors is to alarm if oxygen and hydrogen levels increase toward an explosive mixture.

During the period of April-September 1987, ten DRs were written for operational problems with these analyzers. In each case, the instruments were recalibrated and returned to service. The instrumentation maintenance supervisors indicated that the problems with these analysers were temperature sensitivity and being prone to drift. The analyzers were located in the basement of the fuel building, which was not air conditioned. During warm weather, it was not unusual for the analyzers to drift out of tolerance prior to the scheduled PMs (monthly functional test and quarterly calibration). The supervisors stated that these analyzers were also used in other industries, where calibrations were typically done more frequently, sometimes weekly or even daily. Increasing the calibration frequency of the WGDT oxygen and hydrogen analyzers was considered by these supervisors, but was not done. The licensee made a commitment to increase the calibration frequency of these analyzers to at least monthly. The calibration frequency should be based on performance.

The oxygen and hydrogen analyzers have a built-in capability to automatically perform a daily calibration check. For the oxygen channel, this would consist of sampling a gas containing zero percent oxygen for 15 seconds, then sampling a gas mixture containing 5 percent oxygen for 15 seconds. Zero and five percent are the low and high ends of the recorder scale which is located in the control room. Inspection of the control room

recorder chart revealed that no daily calibration checks were recorded for the previous two days. Review of previous charts, in the records library, revealed that only three daily calibration checks (all on the oxygen channel) were recorded from the last week in January through the first week in March 1988. The daily calibration check had not been operating. Reviews of control room logs and interviews with operators revealed that the log sheets did not describe how the operator should inspect and record the daily calibration check. No standards were provided and the operators did not understand that there was a daily calibration check feature, wherein the actual readings of 0% and 5% were important. The hydrogen channel check feature was found to have never been hooked up. The licensee indicated to the inspectors that the oxygen channel calibration check feature would be repaired, control room logs would be changed to provide adequate instructions to the operator, and operators would be trained in proper reading and recording of the daily calibration check.

The vendor had recommended replacement of the existing oxygen and hydrogen monitors with newer models, which are less temperature sensitive and less prone to drifting. The instrumentation maintenance supervisors have submitted a purchase request for new oxygen and hydrogen monitors.

(8) The DR review also revealed a history of repetitive failures of radiation monitors during 1987. The instrumentation maintenance supervisors indicated that these were Kaman Science brand monitors. In response to continual problems, one monitor had been taken out of service for five weeks in late 1987 and during that five weeks, instrument technicians worked with a vendor representative to develop a permanent fix. A field change was developed and implemented, which appears to have substantially improved the reliability of that monitor. The maintenance supervisors stated that the other radiation monitors were being modified to incorporate the new field changes.

In reviewing DRs for repetitive failures, it was determined that the licensee had not done trending of DRs. The licensee committed to begin trending DRs so that repetitive failures would be noted and would receive management attention. It was also noted that trending of work orders for repetitive machinery failures was not effective. A major contributing factor was the large backlog of completed work orders not entered into the machinery history.

(9) A deficiency report and a maintenance work order review revealed a history of repetitive failures of containment isolation valves to pass Type C testing. The valves reviewed were 1HV-MOV-100A and -100B and are the containment purge isolation valves. It was noted in the work order packages that the valve seats were

greased and then retested after initial failure. A detailed review was performed by the inspector and discussions with various technicians disclosed that the greasing of the seat was for aiding in seal adjustment and for seal removal after extended periods. In this case it appeared that lubrication of the valve seating material was an acceptable practice and enhanced valve performance.

Minor deficiencies in the LERs reviewed were noted by the inspector and were pointed out to the licensee. The inspector also noted that a new LER format developed by the licensee in late 1987 appeared to have improved the quality of the LERs, in that the new format leaves less opportunity to omit required information.

The inspectors noted that five of the six LERs reviewed included commitments for follow-up investigations. Yet every one of these LERs stated that no supplemental LER was expected to be submitted. In most of the followup investigations, additional information such as a cause of the event or corrective action was determined. But supplemental LERs were not submitted. The licensee indicated that HPES and engineering investigation reports would be reviewed in the future for the need to submit supplemental LERs.

In contrast to the high quality found in the HPES reports, the inspectors noted that some engineering investigation reports were not written (i.e., August 1987 trip of all CW pumps) or poorly done. Further, it was noted that HPES reports were distributed through the corporate operational experience review (OER) program, where they got additional review and dissemination. Engineering reports were not distributed through corporate OER. The licensee stated that future engineering investigation reports would be of better quality and would be distributed through corporate OER.

No violations or deviations were identified.

7. Management Controls (30702, 40700)

The organizational structure was reviewed to determine that it was prescribed by corporate policy documents and standards; that its functions were adequately defined by administrative procedures; and, that staffing and staffing plans appeared adequate to fulfill the chartered roles.

The status of implementation of major organizational functions was determined by review of procedures, review of records, interviews and discussions with licensee managers, supervisors and staff personnel inside and outside the departments of interest.

a. Station Nuclear Safety and Operating Committee

The activities of the onsite safety review committee, the Station Nuclear Safety and Operating Committee (SNSOC), were reviewed to determine if the committee was functioning as required by the Technical Specifications (TS), was providing adequate interface with various plant disciplines, and was performing adequate safety evaluations.

In addition to the requirements delineated in the TS, the SNSOC activities are controlled by administrative procedure ADM-1.1. To review the committee's activities the inspector reviewed the following SNSOC documentation:

- ADM-1.1, Station Nuclear Safety Operating Committee, dated June 16, 1987
- Nuclear Operations Department Administrative Standard, Management Overview, NODS-ADM-03, Rev. 0
- NODS-ADM-06, Organization, Responsibility and Interfaces, Rev. 0
- ADM-1.0, Station Organization and Responsibility, dated July 9, 1987
- TS Section 6.5.1
- Selected meeting minutes

In addition, the inspector attended SNSOC meetings, interviewed members, and alternate members.

The SNSOC holds meetings usually on the order of once a month. More frequent meetings or special meetings are held as needed. There is good member participation during the meetings and evidence of strong management control. The committee encourages outside participation. This was evidenced by participation by individuals and their supervisor who were initiating a permanent procedure change, deviation or other administrative action. These individuals were required to present their issues and resolution at the SNSOC meetings.

The SNSOC appears to be accomplishing their mission and performing adequate reviews and safety evaluations. The use of outside individuals and their supervisors is considered an effective enhancement, promoting clear communication among all parties.

No violations or deviations were identified.

b. Plant Status Meetings

Various plant status meetings were attended to determine whether day-to-day plant activities and planned future activities were being adequately disseminated to the applicable plant staff.

To review the plant status meetings, the inspector attended selected daily plant meetings. The licensee's daily plant status meetings consisted of the following:

- 8:15 a.m. Executive Management Meeting
- 11:00 a.m. Planning Meeting
- 3:00 p.m. Plan-of-the-Day meeting

There appeared to be good interface between plant groups and good participation by personnel in plant status meetings. The various status meetings provided a discussion of plant conditions and ongoing planned maintenance and/or testing activities. There is good management control at the meetings and adequate multi-discipline attendance including the security personnel.

The inspector noted that the Superintendent of Operations and the Superintendent of Maintenance conducted daily tours of the facilities and that senior management conducted random assessment visits during off normal working hours. The inspector observed that during these tours the managers take on-the-spot, immediate, and effective actions to have problems resolved and more importantly bring it to the attention of the individual involved. It was also noted that these managers frequently had their next lower tier supervisor accompany them during these tours, which reinforced what management considered to be an acceptable plant standard.

The licensee appeared to conduct effective and terse management meetings to evaluate issues coupled with active management involvement in daily activities.

No violations or deviations were identified.

c. Nuclear Safety Engineering

The activities of the Nuclear Safety Engineering (NSE) group were reviewed to determine if they were functioning as required by the TS, were providing adequate interface with various disciplines, and were maintaining surveillance of plant activities to provide independent verification that these activities were performed correctly and that human errors were reduced as much as practical.

In addition to the requirements in the TS, the NSE activities are delineated in ADM-1.2, Nuclear Safety Engineering, dated February 3, 1988. To review the group's activities the inspector interviewed the NSE Supervisor, several engineers and reviewed the following administrative procedures:

- ADM-1.2. Nuclear Safety Engineering, dated February 3, 1988
- ADM-5.3, Review of Procedures, dated March 10, 1988
- ADM-6.19, Processing of Significant Operating Experience Reports (SOER), dated September 11, 1986
- ADM-16.17, Human Performance Evaluation System (HPES), dated May 28, 1987
- ADM-16.14, Commitment Tracking Program, dated August 20, 1986
- ADM-15.0, Nonconformance Reports, dated May 29, 1986
- ADM-6.14, Control of Engineering Work Requests, dated March 31, 1983
- ADM-3.9, Evaluation for Potential Unreviewed Safety Questions, March 19, 1987

The inspector determined from the above reviews and interviews that NSE had 16 degreed engineers, of which, seven are certified STAs; six are qualified to be certified STAs, and two are to be placed in the next certification class. This group appeared to be providing adequate on-going reviews and assessments of plant operations. Additionally, the NSE provided adequate reviews of INPO Significant Operating Experience Reports, industry events, NRC I&E Notices and Bulletins, and Licensee Event Reports.

The NSE was also responsible for coordinating the Human Performance Evaluation System (HPES) program. A HPES pilot program was implemented onsite in 1985. The program was designed to uncover specific adverse administrative practices and human engineering hardware deficiencies which contribute to inappropriate actions. This program allowed anyone to report a potential problem that may affect safe operation, reliability, availability or an inappropriate action concerning personnel performance. The program was formalized in 1986. A review of HPES reports and resultant actions indicated that this program appeared to have a positive impact in reducing human errors in plant operations. The HPES program is considered a strength.

No violations or deviations were identified.

d. Quality Control

The inspector conducted interviews with the Manager Quality Assurance, supervisors and inspectors. He also reviewed the following documents:

- Nuclear Operation Department Policy Statement (NODPS)-QA-01, Quality Assurance/Quality Control, Rev. 0
- NODPS-QA-02, Corrective Action, Rev. 0
- Nuclear Operations Department Standard (NODS)-QA-01, Corrective Action, Rev. 1
- NODS-QA-02, Audits, Rev. 1
- NODS-QA-03, Inspection/Surveillance, Rev. 0
- VEP-1-5A Topical Report, Operations Phase QA Program

- Quality Assurance Organization Policy Statement (QAOPS) -2.3, Corrective Action, Draft
- Quality Assurance Organization Standard (QAOS)-2.3, Corrective Action, Draft
- Quality Assurance Department Instruction Nuclear (QADIN) A 4.0, Certification Program for Inspectors Assigned to the Quality Assurance Department, Rev. 1
- QADIN C1.0, Surveillance Program Administration & Operation, Rev. 0
- QADIN Guideline 2C.1, Inspector of the Day Guideline, Rev. 0
- Audit Schedule
- Surveillance Schedule
- Completed Audit Reports
- Quality Maintenance Team (QMT) - ADM-2.11, dated February 12, 1988

The inspector noted from the above interviews and reviews that the licensee had determined that the audit and surveillance groups spent approximately 60 percent of their time performing collateral tasks, detracting from their basic responsibilities. Although it had not prevented QA from meeting its audit schedule, the collateral tasks had caused issuance of the audit reports to be delayed. During the first quarter of the year, the QA surveillance group missed several scheduled surveillances. Further review indicated that this was due to special surveillances being implemented in response to industry-wide INPO and NRC issues. A review of the missed scheduled surveillances indicated that no TS requirements were impacted. The licensee is restructuring responsibilities within the QA department to allow the audit and surveillance personnel to devote the majority of their time to their auditing and surveillance responsibilities.

The licensee utilized an "Inspector of the Day" (IOD) program to provide daily coverage of plant activities, seven days a week. The IOD was not assigned any other responsibilities on their "duty" day. Their responsibilities included walkdown of areas of management interest, observation of special evolutions, observation of repairs or modification activities, and informing the SS and cognizant supervisor when violations or unsafe conditions were noted. This program was considered a strength.

Quality Maintenance Team (QMT) concept was implemented in 1986. The licensee's goal is to develop 18 teams. These teams will perform their own QC inspection and radiological control functions. The intent is to build quality into the maintenance activity. The team building was approximately 70% complete. The mechanical maintenance teams were the first groups to be formed and the QMT program is expanding to include the electrical and I&C disciplines. Maintenance personnel stated they felt the QMT program had increased work quality. However, the three mechanical maintenance QMT members who were interviewed all stated they felt uncomfortable performing their own health physics duties, particularly on more complex tasks.

The licensee appears to have devoted many hours toward developing this program. They have provided designated personnel from Corporate, Surry, and North Anna to form a Quality Managing Steering Team and a Quality Managing Working Team. These teams meet frequently to discuss problem areas and explore possible enhancements. This program was considered a strength. A note worthy concept employed is that the certified QMT inspector will be administered a recertification performance inspection approximately every six months. The QMT inspector will perform an inspection activity while being observed by a QC department inspector, as required by QADIN A 4.0 Rev. 1, Section 5.6.

However, the inspector noted one QMT program area considered to be a weakness. The QMT is required to perform a pre-job briefing and a post-job briefing. The QC department appears to be attending only the pre-job briefings. No QC observations were made during the post maintenance briefings to ensure that the team is addressing the quality aspect or problems encountered.

In addition, considering the licensee's high expectation of the QMT program, there hasn't been a QA assessment conducted since the program was implemented. This is considered a weakness in that the licensee has not assessed that the actual mechanics of the maintenance activities are providing the quality of work that is perceived by management.

No violations or deviations were identified.

8. List of Acronyms

BOP	Balance of Plant
CRO	Control Room Operator
CTS	Commitment Tracking System
CW	Circulating Water System
DR	Deviation Report
EDO	Executive Director for Operations
HPES	Human Performance Evaluation System
HP	Health Physics
ISC	Instrumentation and Controls
IEB	Inspection and Enforcement Bulletin
IEN	Inspection and Enforcement Notice
IFI	Inspector Followup Item
INPO	Institute of Nuclear Power Operations
LER	Licensee Event Report
MOVAT	Motor Operated Valve Analysis and Testing
MSIV	Main Steam Isolation Valve
MWO	Maintenance Work Order
NODPS	Nuclear Operations Department Policy Statement
NODS	Nuclear Operations Department Standard
NPRDS	Nuclear Plant Reliability Data System
NRC	Nuclear Regulatory Commission
NSE	Nuclear Safety Engineering

OER	Operational Experience Review
OJT	On The Job Training
O&M	Operation and Maintenance
OMC	Operations Maintenance Coordinator
OP	Operating Procedure
OPA	Operational Performance Assessment
PM	Preventive Maintenance
PMT	Post Maintenance Test
POD	Plan Of The Day
PORV	Power Operated Relief Valve
PT	Performance Test
QA	Quality Assurance
QADIN	Quality Assurance Department Instruction Nuclear
QAOPS	Quality Assurance Organization Policy Statement
QAOS	Quality Assurance Organization Standard
QC	Quality Control
QCAR	Quality Control Activity Report
QMT	Quality Maintenance Team
QS	Quench Spray
RCP	Reactor Coolant Pump
RHR	Residual Heat Removal
RS	Recirculation Spray
RWP	Radiation Work Permit
SALP	Systematic Assessment of Licensee Performance
SG	Steam Generator
SNSOC	Station Nuclear Safety and Operating Committee
SOER	Significant Operating Experience Report
SRO	Senior Reactor Operator
SS	Shift Supervisor
STA	Shift Technical Advisor
TS	Technical Specification
TSC	Technical Support Center
URI	Unresolved Item
WGDT	Waste Gas Decay Tank
WO	Work Order
WR	Work Request