



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

Report Nos.: 50-338/90-15 and 50-339/90-15

Licensee: Virginia Electric & Power Company
 5000 Dominion Boulevard
 Glen Allen, VA 23060

Docket Nos.: 50-338 and 50-339

License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Conducted: May 26 - July 14, 1990

Inspectors:	<u><i>[Signature]</i></u>	<u>8-9-90</u>
	M. S. Lesch, Senior Resident Inspector	Date Signed
	<u><i>[Signature]</i></u>	<u>8-9-90</u>
	P. King, Resident Inspector	Date Signed

Accompanying Inspectors: A. B. Ruff
 S. M. Shaeffer

Approved by:	<u><i>[Signature]</i></u>	<u>8/9/90</u>
	P. L. Fredrickson, Section Chief	Date Signed
	Division of Reactor Projects	

SUMMARY

Scope: This routine inspection by the resident inspectors involved the following areas: operations, maintenance, surveillances, engineered safety feature walkdown, operational event followup, licensee self assessment, licensee event report followup, and action on previous inspection findings. Meetings were held with local officials to discuss the NRC mission and objectives. During the performance of this inspection, the resident inspectors conducted reviews of the licensee's back-shift operations on May 30 and 31, June 9 and July 13.

Results: Within the areas inspected, one violation, two non-cited violations, one strength and three weaknesses were identified. The violation included three examples involving the failure to follow procedures and an inadequate procedure. A failure to use the correct procedure for calibrating the hydrogen analyzers and the use of uncontrolled vendor reference material were identified. Inadequate calibration acceptance criteria in the procedure was also identified (paragraph 3.b). A strength was identified regarding performance based

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inspections which are conducted by the Quality Assurance Department onsite and monthly exits held with management and responsible groups. The process is considered a strength in that it is effective in keeping management aware of concerns and assuring accountability of previous items (paragraph 7).

A weakness involving the lack of an operational review of work orders during the planning stages was identified and contributed to the failure to maintain structural integrity of the service water pumphouse (paragraph 6). A procedural weakness was identified which did not assure that quench spray pump testing allowed for the required stabilization period prior to recording data (paragraph 4.a). A weakness was also identified concerning the approved red-lining of CR and TSC drawings (paragraph 10). Two non-cited violations were also identified involving a failure to identify excessive vibration data on the casing cooling pump (paragraph 9) and inadequate administrative controls associated with the removal of missile shield blocks (paragraph 6).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *M. Bowling, Assistant Station Manager
- *R. Enfinger, Assistant Station Manager
- *W. Hartley, Nuclear Oversight Board
- *D. Heacock, Superintendent, Engineering
- G. Kane, Station Manager
- P. Kemp, Supervisor, Licensing
- W. Matthews, Superintendent, Maintenance
- A. Parker, Supervisor, Maintenance Engineering
- D. Roberts, Nuclear Safety Engineering Supervisor
- *R. Sanders, Manager Nuclear Licensing and Programs
- *J. Smith, Quality Assurance Manager
- A. Stafford, Superintendent, Health Physics
- J. Stall, Superintendent of Operations
- F. Terminella, Supervisory, Quality
- V. West, Superintendent, Outage Management

Other licensee employees contacted included engineers, technicians, operators, mechanics, security force members, and office personnel.

NRC Resident Inspectors

- L. King, Resident Inspector
- *M. Lesser, Senior Resident Inspector

*Attended exit interview

Acronyms and initialisms used throughout this report are listed in the last paragraph.

2. Plant Status

Unit 1 operated the entire inspection period at or about 100% power and completed the inspection period at day 171 of continuous operation online.

Unit 2 commenced the inspection period operating at 100% power. On June 24, reactor coolant system boron concentration reached 0 ppm and the unit commenced the scheduled power reduction with coastdown expected to continue until September 7. The unit ended the inspection period at 85% power, day 432 of continuous operation on-line.

3. Maintenance (62703)

Station maintenance activities were observed/reviewed to ascertain that the activities were conducted in accordance with approved procedures, regulatory guides and industry codes or standards, and in conformance with TS requirements. Portions of the following maintenance activities were witnessed or reviewed:

ICP-P-1-MI3	Calibration of Unit 2 Hydrogen Analyzer
O-MPM-0102-01	Auxiliary Feed Pump Preventive Maintenance
Work Order 73615	Disassembly and Repair of Check Valve 2-FW-11
EWR 90-113	Quench Spray Pump Seal Replacement

a. Quench Spray Recirculation Pump Seal Replacement

On July 9, 1990 the inspector witnessed a portion of the seal replacement on 2-QS-P-2B quench spray recirculation pump. The pump has had several seals replaced due to leakage and a new design mechanical seal was being installed to attempt to reduce the leakage problems.

The inspector reviewed EWR 90-113 which had been written to resolve the seal failures caused by excessive shaft deflection. The A quench spray pump for both units was fitted with a new 5 Star mechanical seal which is supposed to accommodate up to .025 inch axial deflection. The B quench spray pumps for both units will be fitted with a carbon throat bushing below the Chesterton 1-2-3 mechanical seal. The licensee will monitor performance of the seals to insure that runout of the B pump is less than .002 inch, which is the maximum tolerance for the Chesterton seal. The evaluation period will be controlled by the preventive maintenance program on a quarterly basis. Maintenance and System Engineering will continue to review the seal performance.

On July 10, the inspector reviewed the progress on the seal replacement and found that a new stub shaft needed to be fabricated due to exceeding axial tolerances. The stub shaft is the shaft between the motor and the pump. The inspector reviewed the procedure and the radiation work permit and did not identify any problems.

b. Calibration of Containment Hydrogen Analyzer

On June 26, the inspector witnessed calibration activities on the Unit 2 containment hydrogen analyzer, 2-HC-H2A-201. The licensee had identified recurring failures of O-rings in the heated sample compartment due to incorrectly calibrating the temperature controller in an oil bath instead of air, the actual controller environment. The Unit 1 hydrogen analyzer had recently been found controlling the heated sample compartment at excessive temperatures.

The inspector reviewed the procedure in use, ICP-P-1-MI-3, Miscellaneous Safety Related Instruments. Since the hydrogen analyzer is classified as EQ, the inspector questioned the use of the procedure since step 1.0 specifically prohibits its use on EQ equipment. It was later determined that the same incorrect procedure had also been used to calibrate the Unit 1 hydrogen analyzer. The licensee determined that the outcome of the calibrations were not affected by the use of the incorrect procedures. This is identified as a failure to follow the requirements of the procedure and is the first of three examples of violation 338,339/90-15-01.

The purpose of the heater in the hydrogen analyzer is to maintain the heated sample compartment within the design temperature range of 260 - 300F. The calibration procedure is to check two switches: TSW-3, which energizes and deenergizes the heater to maintain the temperature and TSW-1, which provides a low temperature alarm below 250F. The inspector questioned the acceptance criteria in the procedure in that while the desired trip or heater cutoff was $\leq 300F$, an acceptable tolerance band was not specified, nor was a band specified for the low temperature alarm of $\leq 250F$. Additionally although the reset points for both switches were fixed and nonadjustable, "as found" data was not compared against any acceptance criteria. The vendor manual notes that values found beyond the nonadjustable setpoint would require replacement of the switch. The concern with the procedural inadequacy is that the heater and the low temperature alarm setpoints conceivably could have been found at values significantly below the desired values rendering the equipment inoperable, yet still meet the acceptance criteria. This is identified as an inadequate procedure in that incorrect acceptance criteria was specified and is the second of three examples of violation 338,339/90-15-01.

The inspector witnessed testing of the heater cutoff point which was found to be 302.5F, a value outside the acceptance criteria of $\leq 300F$. An evaluation had to be conducted to determine that the value was acceptable. The acceptance criteria had been written into the procedure by the instrument technicians and the inspector asked to review the reference material used to determine the basis. The inspector was shown pages which had been copied from an uncontrolled vendor manual obtained from Surry Power Station. Maintenance Department Administrative Procedure (MDAP) 0002, Conduct of Maintenance, requires that activities affecting safety-related equipment be performed using only controlled vendor manuals. This is identified as a failure to follow procedures and is the third example of violation 338,339/90-15-01.

Concerns with the failures to follow procedures and the apparent lack of support from the maintenance staff in providing the technicians with adequate guidance and reference material were expressed to licensee management. The licensee took prompt corrective actions to

ensure the calibrations were acceptable, to approve the vendor manual, to upgrade the procedure and to counsel the individuals involved.

c. AFW Pump Routine Maintenance

On July 6, the inspector witnessed routine maintenance activities on the Unit 1 AFW pump, 1-FW-P-3A. Activities included lubricating the coupling, bearing oil changeout, bearing oil cooler inspection and repair of a union leak. A new, upgraded procedure, O-MPM-0102-01, AFW Pump Preventive Maintenance, was being used. The inspector reviewed the procedure and noted it to be comprehensive.

Upon coupling reassembly, the inspector observed the injection of grease. The inspector noted that the lube ports were not lined up 180 degrees as required by the procedure and pointed this out to the technician. The technician stated that the coupling halves had been marked prior to disassembly and reassembled in the same manner and that the lube port position did not matter. The inspector told the technician that approval would be needed to deviate from the procedure. The technician agreed and pursued the necessary approval.

The inspector voiced a concern to the licensee regarding the use of the upgraded maintenance procedures by personnel. Since the new procedures are more detailed and have more sign-off steps, personnel may have a tendency to get ahead of the procedure. Steps must be read, completed and signed off individually rather than in blocks. The licensee agreed with the observation and will continue to emphasize the requirements.

Three examples of a violation were identified.

4. Surveillance (61726)

The inspectors observed/reviewed IS required testing and verified that testing was performed in accordance with adequate procedures, that test instrumentation was calibrated, that LCOs were met and that any deficiencies identified were properly reviewed and resolved. Portions of the following surveillances were witnessed or reviewed:

1-PT-77.1A	Safeguards Area Ventilation Flow Test
2-PT-32.3.1	Channel III Feed Flow Steam Flow Functional Test
1-PT-36.9.1H	Degraded Voltage, Loss of Voltage Functional Test
1-PT-63.1B	Quench Spray System B Periodic Test
2-PT-64.1A	2A Outside Recirculation Spray Pump Test

a. Quench Spray Pump Operability Testing

On July 9, the inspector observed testing to verify operability of the QS pump 1-QS-P-1B, using 1-PT-63.1B, Quench Spray System B Periodic Test. The inspector questioned the operators on whether the test lineup rendered the train inoperable and was told that the pump was considered operable. It was noted that a TS action had not been entered. Further review of the procedure by the inspector determined that the pump was inoperable due to the following reasons:

- (1) Step 6.5 required the power supply for 1-QS-MOV-102B, Chemical Addition Tank Supply to RWST Isolation Valve, to be deenergized. This would prevent the valve from opening on an ESF signal and performing its safety function of supplying sodium hydroxide to QS.
- (2) Step 6.6 required 1-QS-21, Manual Recirculation Line Isolation Valve, to be opened. Following an ESF signal, excessive QS flow would be diverted back to the RWST, preventing the pump from supplying design flow to the containment spray header.

It was noted that there were no controls to effectively restore the equipment to operable status in an emergency. The test was completed and the lineup restored within the allowable outage time of the TS, therefore a TS violation did not occur. The inspector was concerned, however, that the train had not been formally declared inoperable and that controls did not exist to ensure the allowable outage times would not be exceeded or that the opposite train would not be removed from service.

The licensee addressed the inspector's concerns by stating that they would develop a policy for declaring equipment inoperable during testing. This is identified as Inspector Followup Item 338/90-15-02: Policy Development for Testing Lineups Rendering Equipment Inoperable, pending generation of guidance by the licensee.

Further review of the test procedure identified a weakness in that the procedure did not assure that the pump was running for at least 5 minutes prior to observing and recording data. This is required by IWP-3500 in order to establish a stable reference point. The inspector could not verify if the requirement had actually been met because the procedure does not require recording of the times. The licensee corrected the procedure. Licensee review determined this to be an isolated case.

b. Outside Recirculation Spray Pump Testing

On July 10, the inspector witnessed 2-PT-64.1A, Unit 2A Outside Recirculation Spray Pump Test. This was the first time the licensee ran the pump for 5 minutes prior to recording test data. The pump

discharge pressure reached the high alert range, exceeding the acceptance criteria by 3 psig. Following pump shutdown, it was observed that the discharge gage still read 3 psig.

The licensee ran the pump a second time using a Heise gage on the pump discharge to obtain a more accurate reading. During the test it was noted that pump discharge pressure continued to rise and a stable point was never achieved. After securing the pump the discharge pressure indicated 7 psig. The licensee determined that the continuous pressure increase resulted from heating of the small volume of water in the piping due to pump recirculation flow back to the suction. The licensee subtracted the static discharge pressure from the operating discharge pressure to compare against the acceptance criteria and determined it to be satisfactory. The licensee will revise the test procedure to take into account the heating effect and to caution the operator not to exceed design pressures. This item will be reinspected pending review by the licensee and is identified as Inspector Followup Item 339/90-15-03: Outside Recirculation Spray Pump Test Resulting in Continuous Pressure Rise Due to Fluid Heatup.

No violations or deviations were identified.

5. ESF System Walkdown (71710)

The inspectors performed walkdowns of portions of the Unit 1 Auxiliary Feed and Unit 2 Outside Recirculation Spray systems. Labelling deficiencies were noted on HCV-FW-100B, MOV-FW-100D, and 1FW-148. These were forwarded to the shift supervisor for resolution.

No violations or deviations were identified.

6. Operational Safety Verification (71707)

By observations during the inspection period, the inspectors verified that the control room manning requirements were being met. In addition, the inspectors observed shift turnover to verify that continuity of system status was maintained. The inspectors periodically questioned shift personnel relative to their awareness of plant conditions. Through log review and plant tours, the inspectors verified compliance with selected TS requirements and LCOs.

In the course of the monthly activities, the resident inspectors included a review of the licensee's physical security program. The performance of various shifts of the security force was observed in the conduct of daily activities to include: protected and vital areas access controls, searching of personnel, packages and vehicles; badge issuance and retrieval; escorting of visitors; patrols; and compensatory posts. On a regular basis, RWPs were reviewed and the specific work activity was monitored to assure that the activities were being conducted per the RWPs.

The inspectors kept informed, on a daily basis, of overall status of both units and of any significant safety matter related to plant operations. Discussions were held with plant management and various members of the operations staff on a regular basis. Selected portions of operating logs and data sheets were reviewed daily. The inspectors conducted various plant tours and made frequent visits to the control room. Observations included: witnessing work activities in progress; verifying the status of operating and standby safety systems and equipment; confirming valve positions, instrument and recorder readings, and annunciator alarms; and observing housekeeping.

On May 23, the licensee discovered the concrete roof blocks were not installed on the SW pumphouse. The pumphouse is designed to protect the SW pumps from projectiles or missiles resulting from high winds or tornados. The concrete roof blocks are removable to access the SW pumps for maintenance, however must be in place to ensure pumphouse integrity. The licensee immediately initiated actions to properly replace the concrete roof blocks.

The licensee determined that two separate activities were responsible for removing the blocks and that at least one set of blocks had been removed from October 31, 1989 until replacement on May 23, 1990. The two activities in question were corrective maintenance of the SW screen wash pump and SW pump electrical cable replacement.

The design basis for the SW system is to function assuming an accident on one unit with the second unit shutting down concurrent with a loss of offsite power. A tornado is not assumed to occur during the accident.

The inspector determined that the SW pumps for both units would have been susceptible to damage had a tornado occurred during the time period. The licensee pointed out that the auxiliary SW pumps were available as an alternate source of SW supply, although they would have to be manually lined up and do not receive automatic start signals. The inspector reviewed the maintenance history and verified that the auxiliary SW pumps were available. Although the concrete blocks were not installed, a 1/4 inch steel rain plate was installed and afforded some level of protection. During the event, the licensee activated its severe weather conditions implementing procedure on four occasions, however, potentially damaging wind speeds were never achieved.

Based on the circumstances, the inspector determined that the event had a reduced level of safety significance, however, some areas of concern were identified. The licensee's abnormal procedures for loss of SW do not refer the operators to procedures which would initiate auxiliary SW. The licensee agreed to review this.

The cause of the event appears to be inadequate planning of the activities and a failure to maintain administrative controls over the blocks. Consideration was not given to the consequences of removing the roof blocks and operations personnel were unaware of the condition. Since

removal of the blocks was included as a step in the SW screen backwash pump work order, opportunities for detection were missed by the Operations Maintenance Coordinator and the Shift Supervisor. Neither individual typically reviews work orders or procedures in detail. Daily work orders do not get any type of review on the front end by operations. This appears to be a weakness with the licensee's daily planning program. This item will be reinspected pending improved performance by the licensee and is identified as Inspector Followup Item 338/90-15-04: Need for Front End Operations Review of Work Orders. The failure to maintain adequate controls over safety-related equipment is identified as a violation; but is not being cited because the criteria specified in Section V.G of the Enforcement Policy were satisfied. This is Non-Cited Violation 338/90-15-05: Failure to Maintain Adequate Controls Over Service Water Pumphouse Missile Shield Blocks.

One non-cited violation was identified.

7. Evaluation of Licensee Self Assessment (40500)

One aspect of the licensee's self assessment program is conducted by site Quality Assurance. Performance based inspections above and beyond required audits are done in various areas and results are documented in a monthly report. Additionally a monthly exit meeting is held with station management and the responsible group to discuss observations, to agree on corrective actions and to followup on previous items. The inspector attended the first meeting on June 5 and concluded that the program is effective in making management aware of any concerns and holding responsible groups accountable for corrective actions. The process is considered a strength.

No violations or deviations were identified.

8. Information Meetings With Local Officials (94600)

On June 27 and 28, the Senior Resident Inspector and the Region II Section Chief met with local officials from Orange and Louisa counties. On July 9, the senior resident inspector met with officials for the town of Mineral, Virginia. The purpose of the meetings was to inform the officials of the mission of the NRC, to introduce key NRC personnel for North Anna, to discuss lines of communication and to discuss the status of North Anna. NRC business telephone numbers were exchanged along with handouts describing the NRC organization.

9. LER Follow-up (92700)

The following LERs were reviewed and closed. The inspector verified that reporting requirements had been met, that causes had been identified, that corrective actions appeared appropriate, that generic applicability had been considered, and that the LER forms were complete. Additionally, the inspectors confirmed that no unreviewed safety questions were involved and that violations of regulations or TS conditions had been identified.

(Closed) LER 338/90-06, Casing Cooling Pump Not Put Into Alert and Missed Surveillance Due to Personnel Error. The licensee performed testing on the Unit 1 Casing Cooling Pump and failed to identify that vibration readings were in the alert range and consequently missed surveillance tests. The causes included personnel error and incorrect computer acceptance criteria. The pump was successfully tested several times later. The licensee believes the alert readings were in error due to incorrect test equipment operation. This failure to perform adequate pump testing is identified as a violation, however, the violation is not being cited because the criteria specified in Section V.G of the Enforcement Policy were satisfied. This is identified as Non-cited Violation 338/90-15-06: Failure to Recognize Casing Cooling Pump in the Alert Range.

(Closed) LER 338,339/88-21, Error In Control Room Habitability Design Basis Calculation. This LER was previously reviewed in NRC Inspection Report 338,339/90-01. This voluntary LER was issued on November 3, 1988, as a result of the discovery of an error in a design basis calculation initiated by an NRC inspection. It was discovered that Stone & Webster calculation number RP117715-A112-0, Fuel Handling Accident Dose to Control Room, erroneously assumed that the CR bottled air system is automatically initiated from a fuel building high radiation alarm. As a result of the error, doses to CR personnel would exceed 10 CFR 2 limits because isolation of the normal ventilation supply does not occur. The licensee compensated for the error in the design basis by revising numerous station operating procedures to require operation of the control room emergency ventilation system (recirculation mode) during fuel movement. This mode of operation provides for isolation of the control room and ensures filtered makeup. The inspector verified that revisions to TS surveillance/periodic testing requirements have been completed for the necessary changes. This issue was related to additional CR habitability problems discussed in an NRC Enforcement Conference on January 18, 1989, with regards to other findings in NRC Inspection Reports 338,339/86-28, 87-19, 88-28, and 88-31.

This LER remained open in NRC Inspection Report 338,339/90-01, pending the completion of outstanding modifications to the CR habitability ventilation system. These included: 1) auto-start of the emergency control room ventilation fans in recirculation mode upon receipt of a bottled air system actuation signal, and 2) auto-isolation of the normal control room air supply and exhaust upon receipt of a fuel building high-high radiation alarm. These modifications were intended to ensure long-term compliance with GDC 19 of Appendix A to 10 CFR 50. The inspector verified the implementation of the modifications and completion of design change package 89-32, Control Room Habitability Mods - Units 1 and 2. This item is closed.

One non-cited violation was identified.

10. Action on Previous Inspection Items (92701, 92702)

- a. (Closed) Violation 339/88-16-02, Emergency Diesel Generators 2J and 2H Inoperable at the Same Time for an Approximate 38 Hour Time Period. Following a preventive maintenance action, the 2J EDG was being tested to verify satisfactory maintenance. During the test, the EDG failed to operate properly and it was declared inoperable for a period for both its corrective action time and the retest time to determine operability. Declaration of inoperability, corrective action and subsequent testing for operability was accomplished on the same day. In that one EDG (2J) was declared inoperable, the other EDG (2H) was required to be tested within 24 hours. After EDG 2J was returned to service status, within 24 hours of being declared inoperable, the station tried to put the EDG 2H on line for operability verification. The DG started, but its output breaker for supplying power to the vital bus in case of an emergency and loss of off-site power failed to close automatically. The EDG 2H was shutdown and the output breaker was inspected. The charging motor for closing the DG output breaker had become disengaged from the breaker housing as a result of loose and missing mounting bolts that had backed out from vibration over a period of time. This event was reported by the licensee in accordance with 10 CFR 50.73(a)(2)(v) and a LER 339/88-04 was issued. An Enforcement Conference for this event was held on July 6, 1988 in the NRC Region II Office in Atlanta, Georgia. The corrective action to prevent reoccurrence of this event are discussed in NRC Inspection Report 338,339/89-03 for closing the LER.

As indicated in NRC Inspection Report 338,339/88-16, this type of breaker failure and problem associated with loose mounting bolts was previously identified to the industry by NRC IEN 87-41 dated August 1987 and INPO SER 14-87 dated May 1987. It was considered that this event could have been prevented by a better operating event review program at North Anna. In the Enforcement Conference and subsequent docketed correspondence, the licensee committed to enhance and up-grade their program in this area.

The licensee stated that the following operating experience documents are the minimum that are to be reviewed for possible corrective measures at North Anna:

- NRC Information Notices
- INPO Significant Operating Experience Reports (SOER)
- INPO Significant Event Reports (SER)
- INPO Operations and Maintenance Reminders (O&MR)
- Surry and North Anna Licensee Event Reports (LER)
- Surry and North Anna Human Performance Evaluation System (HPES) Reports
- North Anna Station Deviation Reports
- INPO Network

The North Anna OER program was enhanced and up-graded in part by procedures that were issued and implemented. Procedures that were issued, revised or up-dated included the following:

- 1) Virginia Power Corporation Procedure; SEC-ADM 2.2, Review Criteria and Processing of Operating Experience.
- 2) Virginia Power Corporation Nuclear Operations Department Standard; NODS-LR-03, Standard for Operating Experience Review
- 3) North Anna Administrative Procedure; ADM 6.20, Operating Experience Review.

Since the initial implementation, Items 1) and 2) have been revised and superseded by: 1) NL&P-ADM-4.1, Review and Processing of Industry Operating Experience Documents, dated May 1990, and 2) Standard No. NODS-SP-05, Special Programs Standard-IOER, dated January 1990.

The Quality Assurance Department performed a review of the OER program effectiveness as indicated by their activity report QCAR N89--565 of October 1989. Deficiencies and recommendations were identified in that report. This violation is closed.

- b. (Closed) URI 338,339/89-11-02, Specific Identification of RG 1.97 Indicators. Regulatory Guide 1.97, Instrumentation for Light-Water-Cooled Nuclear Power Plants to Assess Plant and Environs Conditions During and Following an Accident, revision 3, section 1.4b states that the instruments designated as Types A, B, and C and Categories 1 and 2 should be specifically identified with a common designation on the control panels so that the operator can easily discern that they are intended for use under accident conditions. The licensee indicated, as documented in NRC Inspection Report 338,339/89-11, that the labeling on control panels was being assessed further as part of the Control Room Design Review in response to NUREG-0737, supplement 1 and was covered by Corrective Action CA29E. The licensee has initiated labeling of RG 1.97 indicators in the control room in accordance with section 6.4.3. of Standard GN-0036, "Equipment Labeling and Tagging". The unique identification will consist of a black diamond in the upper right quadrant of the label tag for the instrument. An inspection was made in the control room to verify that labeling was being performed, however, not all RG 1.97 designators have been installed. The licensee stated that all up-graded labels and tags including those for RG 1.97 would be installed by June 1, 1992 in accordance with Administrative Procedure, ADM-20.44, System and Component Labeling. This item is closed.
- c. (Closed) URI 338,339/88-31-03, HHSI Pump Operability With Voids In the Piping. Concerns were identified which determined that various piping sections of the Safety Injection System (SI) and Chemical Volume and Control System (CVCS) collected or trapped gas which might affect the functions of these systems. Voluntary LER 338, 339/88-22

(Supplement 3) was issued as a result of licensee investigations due to the issuance of NRC Information Notice 88-23, Potential for Gas Binding of High-pressure Safety Injection Pumps during a Loss-of-Coolant Accident. Voids were detected in some of the LHSI to HHSI pump suction piping and in the RWST piping to the HHSI pumps. Immediate corrective actions included venting of the affected piping and ultrasonic inspection to assure the piping was adequately filled. A JCO was also written to allow continued operation for piping which could not be vented. Subsequently, high point vents have been installed on both Unit 1 and 2 susceptible piping in order to minimize the entrapped gas collection during maintenance. Also, multiple pump performance tests have been performed at full flow and have not indicated any adverse effects from voiding.

The licensee contacted an engineering consultant to analyze the effects of trapped gas on HHSI pump operation. The consultant concluded that the gas pockets found in the highpoints of the SI system were not likely to be transported intact from the as-found location in the piping to the HHSI pump suction. This conclusion was based on the significant drop in pipe elevation to the pump suction header and again to each individual pump suction. It was also concluded that small quantities of air will have no measurable impact on pump performance and that, during operation, the gas voids are eventually scoured away. The pump manufacturer has also reviewed these results and concurs with its conclusions. An engineering evaluation was performed which demonstrated an acceptable level of water in the individual six-inch suction piping for the HHSI pumps. UT inspections were completed on a weekly basis for approximately eight months during both power and refueling operations. Except during unit outage and startup, HHSI suction piping water level remained over 50 percent full with the HHSI normal suction piping averaging approximately 70 percent full. A test was performed on Unit 2 in February 1989, which demonstrated pump performance with a 50 percent water level in the normal suction piping.

No degradation in HHSI pump performance was identified. In addition, the licensee has verified that the HHSI pump NPSH available with the normal suction piping 50 percent full is greater than the required NPSH for the HHSI pump during full flow conditions.

The inspector reviewed LER 338,339/88-22 closeout package which included the consultants report on the gas piping of the charging pumps, dated January 19, 1989, JCO 89-04, dated February 1, 1989, the pump's manufacturer's concurrence letter dated December 23, 1988 and other associated documentation. Based on the inspectors' review of the licensee's evaluation and conclusions of this issue and the evidence of sustained performance of the HHSI pumps over many years of operation, the inspection considers this item closed.

- d. (Closed) VIO 338,239/88-33-02, Failure to have an adequate program that updates system drawings to reflect changes. The subject violation was caused by inadequate controls for transferring existing redline information on control room drawing to replacement drawings. The corrective actions included a review and verification of control room drawing redlined information. During this review, additional minor problems were identified and corrected. Due to this event, several programmatic enhancements have been made to the drawing control program. The Engineering Department has been given overall responsibility for the drawing control program. Also, the practice of redlining has been eliminated for drawings affected by design change packages except for emergency changes required during non-routine work hours. Redlining for drawings affected by EWRs will be limited as much as possible. All redlined drawings are required to be updated within 15 days. The inspector reviewed Administrative Procedure 6.10, Annotation and Revision of Station Drawings, dated September 7, 1989, which incorporated the revised program change and also sampled redlined drawings from the CR and TSC. During this review, a discrepancy was found in that redlining of CR drawings were not being annotated on the TSC drawings. Administrative Procedure 6.10 Step 4.5.3.1 states that when an operator identifies discrepancies, which could affect the plant operation, the operator should consult the shift supervisor and redline the appropriate drawing. The procedure does not require the redlining of both the CR and TSC drawings. In addition, the inspector questioned whether the redlining of CR or TSC drawings by operators was receiving the proper shift supervisory approval, as some confusion was noted in the licensee's description of the redlining process. The inspector informed the licensee of these weaknesses, and the licensee told the inspector that they were aware of the situation and had plans to include redlining of the TSC drawings as soon as the new drawing program enhancements had reduced the redlining to a manageable level. The licensee stated they would incorporate the changes to require operations redlining both CR and TSC drawings. The licensee also stated that the redlining process was going to be diminished except for certain emergency situations and that this would eliminate the inspectors concern of unreviewed redlining of CR and TSC drawings. The inspector believes that the corrective actions taken for the violation should preclude recurrence and considers this item closed.
- e. (Closed) IFI 338,339/88-36-02, Tagging of the Boric Acid Vent and Drain Valves. The subject IFI was identified during review of an additional example of violation 338,339/88-31-02, which involved numerous examples of procedure adequacy and adherence. The specific event involved the opening of an incorrect boric acid drain valve due to improper labeling. In NRC Inspection Report 338,339/88-05, problems were identified in that several of the boric acid system vent and drain valves were not labeled. The licensee stated that since the above event, correct labeling had been performed, however,

the tag must have fallen off. To correct the problem, independent verification of properly hung tags was performed by operations concerning the subject valves in the CVCS system. The inspector reviewed the licensee's closeout package and considers this item closed.

- f. (Closed) URI 338,339/88-36-03, Region II Health Physics Staff Review of the Violation of Radiation Work Permit Requirements. This unresolved item involved an event which occurred on January 16, 1989, where two Stone and Webster Engineering Company (SWEC) engineers violated RWP requirements. The two engineers had just come from the Surry facility and were visiting North Anna to gather information on a potential design change package on the boron injection tank. Due to differences in the HP requirements for high radiation areas between the facilities, the engineers violated HP requirements and entered a posted high radiation area, without a radiation monitoring device and without health physics coverage. This event was identified as an example of a violation in NRC Inspection Report 338,339/89-05. In addition to responding to the violation, the licensee furnished additional information for NRC review of this event. Based on the inspectors review of this material and the subsequent violation, this item is considered closed.
- g. (Closed) IFI 338,339/88-11-04, Development of the Check Valve Program in Response IE Notice 86-09 and 86-01. This IFI was identified in order to follow the licensee's action relating to check valve evaluation and the development of a check valve PM program. The licensee issued VPAP-0807, Check Valve Maintenance Program, effective November 24, 1989, as a result of earlier commitments to establish and implement a check valve PM program in response to INPO SOER 86-3. The procedure establishes requirements and guidelines for developing, implementing, and maintaining a check valve maintenance program in order to test, inspect, and verify operability of check valves. The inspector reviewed the procedure and did not identify any discrepancies. This issue was previously addressed in NRC Inspection Report 338,339/90-01 and was left open due to the recent implementation of the program. No outstanding problems were identified during the initial six months the program has been in effect. This item is considered closed.
- h. (Closed) IFI 338,339/88-31-01, Develop Control Room Adjacent Compartment Ventilation Requirement. The subject of this IFI was also related to an escalated enforcement violation in NRC Inspection Report 338,339/89-36. The issue involved the failure of the licensee to correct deficiencies in the control room bottled air system which resulted in differential pressures between the CR and several adjacent compartments being outside the limits of TS. The licensee evaluated what requirements would be necessary to enable .05 inch of water to be met during control room pressurization. The inspector

reviewed the administrative controls which the licensee developed to ensure that the adjacent compartment ventilation would be operated such that the design function of the control room bottled air would be met. Weekly Periodic Test Procedure, 1-PT-76.4.1, Control Room/Pressure Envelope Ventilation Check, dated March 15, 1990, identifies any pressure adjustments necessary to adjacent compartment pressures relative to the control room and affecting its positive pressure. Also, the Unit 1 and 2 backboard log, 1-Log-6A, was revised to require a once-per-shift check of the CR/Turbine building differential pressure. This specific parameter is being monitored because that it has the greatest potential effect on the CR bottled air system due to large common wall size and a high potential for internal pressure change due to turbine building door openings and possible supply/exhaust combinations. The inspector considers these procedures adequate to enable the licensee to identify and correct differential pressure problems with the control room and the adjacent areas. In addition, subsequent to the end of the inspection period, the licensee performed and passed a CR bottled air dump test which demonstrated system performance. The inspector considers this item closed.

- i. (Closed) 338,339/P2190-04, Notification by Rosemount Inc. of Potential Failure for Models 1153 and 1154 Transmitters. On December 12, 1988 and February 7, 1989, Rosemount Inc notified the industry of potential failure for their 1153 and 1154 transmitters. As a result of this problem, NRC issued on April 21, 1989, IEN 89-43, Failure of Rosemount Model 1153 and 1154 Transmitters, and more recently on March 9, 1990, IEB 90-01, Loss of Fill-Oil in Transmitters Manufactured by Rosemount.

The 10 CFR Part 21 notification from the vendor indicated that the internal loss of fill-oil can cause the transmitters to exhibit reduced performance prior to detectable failure. The reduced performance is considered most noticeably a drift in zero, in span setting, or slow response time to changes in pressure inputs. The notification also indicated that all reported failures occurred during the first 30 months of service and all were preceded by the detectable degraded conditions discussed above.

North Anna stated that they performed a recalibration of all suspected Rosemount transmitters and during this action looked for the detectable degrading signs as described by Rosemount. In addition, all I&C and operational shift personnel were briefed on the potential internal fill-oil loss failure mechanism and associated symptoms of degraded Rosemount transmitters.

NRC IEB 90-01, dated 3/9/90, requires licensees to provide NRC information/data, as indicated in the bulletin, on Rosemount transmitters that have the potential failure mechanism as stated in

the 10 CFR 21 notice. This 10 CFR 21 Notice is closed based on the above and the further inspection and/or review that may be required for closeout of IEB 90-01.

- j. (Closed) IFI 338,339/88-33-05: Recurring Problem With Rubidium in the Auxiliary Building. The licensee was issued a violation for failure to establish a program for reduce leakage from portions of the systems outside containment containing radioactive fluids (338,339/90-04-02). The licensee formed a task force which detected leaks at the VCT level transmitters and adjusted the check valve into the process vent system to improve the negative tank pressure. Extensive maintenance was done on the gas strippers and the Rubidium problems have improved.
- k. (Closed) VIO 338,339/88-36-01: Failure to Take Prompt and Adequate Corrective Action Concerning Instrument Air Quality. The licensee has installed new equipment and made major design changes to the system which have satisfied previous concerns. The new compressors and dryers have been operating satisfactorily and producing high quality air.

11. Exit Interview

The inspection scope and findings were summarized on July 13, 1990, with those persons indicated in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results listed below. The licensee did not identify as proprietary any of the material provided to or reviewed by the inspectors during this inspection. Dissenting comments were not received from the licensee.

<u>Item Number</u>	<u>Description and Reference</u>
VIO 338,339/90-15-01	Three examples of procedural violations involving a failure to use the correct procedure for hydrogen analyzer calibration, inadequate acceptance criteria and use of uncontrolled reference material (paragraph 3.b).
IFI 338/90-15-02	Policy Development for Testing Lineups Rendering Equipment Inoperable (paragraph 4.a).
IFI 339/90-15-03	Outside Recirculation Spray Pump Test Resulting in Continuous Pressure Rise Due to Fluid Heatup (paragraph 4.a).
IFI 338/90-15-04	Need for Front-End Operations Review of Work Orders (paragraph 6).
NCV 338/90-15-05	Failure to Maintain Adequate Controls Over Service Water Pumphouse Missile Shield Blocks (paragraph 6).

NCV 338/90-15-06

Failure to Recognize Casing Cooling Pump in the Alert Range (paragraph 9).

12. Acronyms and Initialisms

AFW	Auxiliary Feedwater
ADM	Administrative
DBA	Design Basis Accident
DG	Diesel Generator
EDG	Emergency Diesel Generator
EP	Emergency Procedure
EQ	Environmentally Qualified
ESF	Engineered Safety Feature
EWR	Engineering Work Requests
FW	Feed Water
GPM	Gallons Per Minute
HHSI	High Head Safety Injection
HPES	Human Performance Evaluation System
HX	Heat Exchanger
I&C	Instrumentation and Control
IEB	NRC Bulletin
IEN	NRC Information Notice
IFI	Inspector Follow-up Item
INPO	Institute For Nuclear Power Operations
IOER	Industry Operating Experience Review
ISI	Inservice Inspection
JCO	Justification for Continued Operation
LBLOCA	Large Break Loss of Coolant Accident
LCO	Limiting Condition for Operation
LER	Licensee Event Report
LHSI	Low Head Safety Injection
MCC	Motor Control Center
MMP	Mechanical Maintenance Procedure
MOV	Motor Operated Valve
NCV	Non Cited Violation
NL&P	Nuclear Licensing and Programs
NODS	Nuclear Operations Department Standard
NRC	Nuclear Regulatory Commission
O&MR	Operating and Maintenance Remainder
OER	Operating Event Review
OP	Operating Procedure
PCT	Peak Centerline Temperature
PPM	Parts Per Million
PSIG	Pounds Per Square Inch Gauge
QA	Quality Assurance
QCAR	Quality Control Activity Report
QS	Quench Spray
RCS	Reactor Coolant System
RG	Regulatory Guide

RHR	Residual Heat Removal
RSHX	Recirculation Spray Heat Exchanger
RTD	Resistance Temperature Detector
RWST	Refueling Water Storage Tank
RWP	Radiation Work Permit
SER	Significant Event Report
S/G	Steam Generator
SI	Safety Injection
SOER	Significant Operating Experience Report
SW	Service Water
TS	Technical Specification
URI	Unresolved Item