



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W., SUITE 2900  
ATLANTA, GEORGIA 30323-0198

Report Nos.: 50-338/95-15 and 50-339/95-15

Licensee: Virginia Electric and Power Company  
Innsbrook Technical Center  
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: July 16 through August 19, 1995

Lead Inspector:

*R. McWhorter*  
R. McWhorter, Senior Resident Inspector

*9-14-95*  
Date Signed

Inspectors: D. R. Taylor  
D. M. Kern  
W. W. Stansberry  
W. J. Tobin  
D. H. Thompson

Approved by:

*G. A. Belisle*  
G. A. Belisle, Section Chief  
Reactor Projects Section 2A  
Division of Reactor Projects

*9/14/95*  
Date Signed

SUMMARY

Scope:

This routine resident inspection was conducted on site in the areas of plant status, plant operations, maintenance observations, surveillance observations, on-site engineering, plant support activities, evaluation of licensee self-assessment activities, Licensee Event Report follow up, and previous inspection item follow up. Licensee backshift activities were inspected on July 16 and August 2, 3 and 4, 1995.

Results:

Plant Operations:

Response and recovery were proper following discovery of a damaged fuel rod during fuel reconstitution. Controls were proper for individual fuel rod removal from a special test fuel assembly for inspection and testing (paragraph 3.1).

The emergency diesel generator fuel oil storage and transfer system was being maintained in accordance with plant Technical Specifications and operating procedures. Good consistency in nomenclature between plant equipment labeling and procedures was noted (paragraph 3.2).

Maintenance:

A violation was identified for a failure to follow procedures in considering the effects that maintenance on one safeguards area ventilation fan would have on the opposite train. Operations support personnel failed to realize that the maintenance activity to open the system would cause a bypass flow path on the opposite train through common ventilation ducts (paragraph 4.1).

Maintenance and post-maintenance testing associated with a packing adjustment on a safety injection valve were properly performed. The licensee reduced the number of safety system manipulations required by planning the maintenance to coincide with surveillance testing (paragraph 4.2).

A violation was identified for a failure to properly review and approve modifications to safety-related components. Field technicians made unauthorized wiring modifications to two safety-related charging system valves. As a result, the valves were subject to overthrust conditions during post-maintenance testing (paragraph 4.3).

Surveillance testing activities associated with service water pump 2-SW-P-1A were properly performed and operators appropriately responded to the test results. Quarterly surveillance test records for the past two years indicated that responses were proper to past test problems. Housekeeping in the service water pump house was poor (paragraph 5.1).

Problems identified during main turbine valve testing were properly evaluated (paragraph 5.2).

A non-cited violation was identified for two failures to complete Technical Specification action statement requirements for manually comparing rod positions when the automatic rod position deviation monitor was inoperable. The automatic rod position deviation monitor was twice rendered inoperable when technicians failed to correctly return plant computer points to service (paragraph 9.2).

Engineering:

A weakness was identified in the Document Management Information System's process regarding drawing updates (paragraph 4.3).

Two special tests were properly planned and conducted to demonstrate that a maintenance activity performed on one safeguards ventilation train did not inadvertently render the other train inoperable. Management attention was appropriate for the special tests (paragraph 6).

Plant Support:

The licensee maintained proper procedures for responding to a sabotage event (paragraph 7.1).

The station performance annunciator program was identified as a strength in licensee self-assessment because it contributed to identifying an undesirable trend in human performance. Additionally, station management gave appropriate attention to the program's results and initiated corrective actions (paragraph 8.2).

## REPORT DETAILS

### 1. Persons Contacted

#### 1.1 Licensee Employees

- \*G. Clark, Acting Manager, Quality Assurance
- \*M. Crist, Director, Corporate Nuclear Safety
  - L. Edmonds, Superintendent, Nuclear Training
  - C. Funderburk, Superintendent, Outage and Planning
  - J. Hayes, Superintendent, Operations
- \*D. Heacock, Assistant Station Manager, Nuclear Safety and Licensing
- \*P. Kemp, Supervisor, Licensing
- \*W. Matthews, Assistant Station Manager, Operations and Maintenance
- \*M. McCarthy, Supervisor, Administrative Services
  - D. Roberts, Supervisor, Station Nuclear Safety
- \*R. Saunders, Vice President, Nuclear Operations
  - D. Schappell, Superintendent, Site Services
  - R. Shears, Superintendent, Maintenance
- \*J. Smith, Superintendent, Station Engineering
  - A. Stafford, Superintendent, Radiological Protection
- \*J. Stall, Station Manager

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

#### 1.2 NRC Personnel

- \*R. McWhorter, Senior Resident Inspector

#### 1.3 Visiting Personnel

The following members of the licensee's Nuclear Oversight Board attended the exit interview:

- \*P. Beard, Senior Vice President - Nuclear Operations, Florida Power Corporation
- \*J. Skolds, Senior Vice President - Generation, South Carolina Electric and Gas Company

\*Attended Exit Interview

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

On July 26, the NRC Acting Branch Chief, Mr. K. D. Landis, visited the site. Mr. Landis toured the plant and met with licensee management and the inspectors to discuss plant status and current issues at the facility.

Effective August 1, the following licensee management changes took place at the North Anna Power Station: Mr. B. Shriver, Superintendent, Station Engineering, was reassigned to the Surry Power Station; Mr. J. Smith, Manager, Quality Assurance (North Anna), replaced Mr. Shriver; Ms. G. Clark, Manager, Quality Assurance (Corporate), replaced Mr. Smith on an interim basis.

## 2. Plant Status

Unit 1 operated the entire inspection period at or near 100 percent power.

Unit 2 operated the entire inspection period at or near 100 percent power except for August 8 and 9, when power was briefly reduced to approximately 85 percent for condenser waterbox repairs.

## 3. Plant Operations (71707)

The inspectors conducted frequent control room tours to verify proper staffing, operator attentiveness, and adherence to approved procedures. The inspectors attended daily plant status meetings to maintain awareness of overall facility operations and reviewed operator logs to verify operational safety and compliance with TS. Instrumentation and safety system lineups were periodically reviewed from control room indications to assess operability. Frequent plant tours were conducted to observe equipment status and housekeeping. DRs were reviewed to assure that potential safety concerns were properly reported and resolved.

### 3.1 Spent Fuel Inspection and Reconstitution

On July 29, operators were withdrawing a damaged fuel rod from spent fuel assembly 1A9 when it was observed that the rod had separated into two pieces. Approximately 90 inches was removed by the extraction tool and approximately 50 inches remained in the fuel assembly. The licensee promptly placed the extraction tool in a safe location and suspended fuel handling pending further investigations. SFP area radiation surveys were conducted and no radioactive releases were identified.

The inspectors reviewed the licensee's investigations and corrective actions. The investigations confirmed that the rod's lower portion remained in the bottom of the assembly and that no fuel pellets were released by the rod's separation. A procedure was then prepared and approved by SNSOC for placing the rod's upper portion on top of a spacer rod inside a storage cylinder in the SFP. The fuel rod was successfully placed in the storage cylinder on July 31. The licensee then terminated further plans to reconstitute both the 1A9 assembly and one other assembly. The inspectors concluded that the licensee had properly responded to the event.

On August 3, the inspectors observed preparations for fuel inspections which were planned for performance using vendor procedure FP-VRA-F11, Fuel Inspection and Repair for North Anna Unit 1, revision 1. The procedure provided instructions for the inspection of one fuel assembly which was clad with various types of zirconium-based material. This fuel assembly, designated AM2, contained rods which were clad with advanced cladding materials and for which post-irradiation non-destructive mechanical property tests were planned. The licensee previously requested and received Unit 1 TS amendments which allowed two such assemblies to be loaded into the Unit 1 core. Assembly AM2 was irradiated for 3 cycles and was scheduled to have 30 rods removed for testing. The process was scheduled to be completed over seven weeks. The inspectors reviewed the process controls for removing individual rods from the assembly, observed removal of a rod from location K5, and reviewed the associated safety evaluations, 95-SE-PROC-20 and 95-SE-PROC-21. The inspectors concluded that the process was properly controlled and that administrative procedures were being properly followed.

### 3.2 Engineered Safety Feature System Walkdown

On August 7 and 8, the inspectors performed an EDG fuel oil storage and transfer system review and walkdown. The review was conducted using station drawing 11715-FB-035A, revision 30, and procedure 1-OP-6.8A, Valve Checkoff-Emergency Generator Fuel Oil System, revision 5. The system alignment was found to be in accordance with the OP and the system drawing. The inspectors noted good consistency in nomenclature between plant equipment labeling and the OP.

The inspectors also verified that required surveillance tests were being conducted in accordance with TS. Specifically, 1995 testing results for the EDG fuel oil samples were reviewed and found to be in accordance with ASTM D975-74 standards with regards to viscosity, water and sediment.

The inspectors discussed with licensee personnel one question regarding the seismic qualification of the underground storage tank vent lines. The vent lines were attached to the non-seismic above ground fuel oil storage tank. The licensee informed the inspectors that this issue had previously been raised and successfully resolved during an NRC EDSFI inspection. The inspectors concluded that the system was properly aligned, adequately maintained, and would perform its design safety functions if called upon.

### 3.3 NRC Notification

The inspectors reviewed the following licensee notification to the NRC to ascertain if the required report was adequate, timely and proper for the event.

On July 16, the licensee notified the NRC, as required by 10 CFR 50.72, concerning the possible identification of a condition that alone could have prevented the fulfillment of a safety function of a system needed to control the release of radioactive material. Specifically, the licensee reported that maintenance on the A train SAVS had unintentionally affected both trains of SAVS and rendered them inoperable. Later, additional tests demonstrated that TS operability and design-basis requirements would have been met under the maintenance conditions. The notification was retracted on July 27 (paragraphs 4.1 and 6).

No violations or deviations were identified.

#### 4. Maintenance Observations (62703)

Maintenance activities were observed and reviewed to verify that activities were conducted in accordance with TS and procedures, and licensee commitments to regulatory guides and industry codes or standards.

##### 4.1 Safeguards Area Ventilation Fan Maintenance

On July 16, during routine backshift observations, the inspectors reviewed planned corrective maintenance to replace a flexible boot at the discharge of SAVS fan 1-HV-F-40A under WO 313822-01. The SAVS contains two fans with common suction and discharge ventilation ducts. The system was designed to ensure that post-LOCA radioactive materials leaking from the ECCS equipment within the safeguards area were filtered prior to reaching the environment. For the maintenance, operators entered a TS 3.7.8.1 action statement which required that the fan be restored to operable status within seven days or the unit be shutdown. If two fans were inoperable, a TS 3.0.3 action statement entry would be required.

The inspectors reviewed the isolation boundary adequacy to verify that maintenance would not affect the remaining operable train. The inspectors determined that the work potentially rendered the second SAVS train inoperable by creating a bypass flow path. The inspectors then proceeded to the maintenance area and found that the maintenance was already in progress. An approximate 15 inches by 15 inches fan discharge inspection port had been removed to facilitate boot repairs. The inspectors observed that air was being drawn from the Auxiliary Building into the open inspection port. The inspectors determined that a parallel suction pathway existed for the remaining SAVS train and that the maintenance activity could potentially reduce the B train flow from the Safeguard Building to below TS limits. This fact was immediately brought to the attention of the Shift Supervisor who confirmed that a parallel suction pathway had been inadvertently established by the maintenance. TS 3.0.3 was then entered from the time the work was started (at approximately 8:15 a.m.). The Shift

Supervisor directed that the inspection port be closed and the maintenance stopped. TS 3.0.3 was exited (at approximately 8:45 a.m.) after the inspection port was closed.

The licensee began efforts to investigate the event's significance. On July 20 and 24, tests were performed to measure the actual bypass flow caused by the maintenance activity (paragraph 6). The tests demonstrated that although the A train maintenance activity did reduce B train flow, flow was maintained above the minimum required by TS surveillance requirement 4.7.8.1.d. Additionally, the test demonstrated that the Safeguards Building was maintained at a negative differential pressure to the environment throughout the event. As a result, the licensee concluded that the B train SAVS could have performed its design basis functions and therefore remained operable throughout the maintenance activity. Additionally, this indicated that the July 16 TS 3.0.3 action statement entry was not required.

The inspectors discussed and reviewed the causes for this event with licensee management. The inspectors and the licensee agreed that despite the engineering tests demonstrating that TS requirements had been met, an error had occurred in the maintenance planning and approval process. The licensee attributed this error to the operations tagging office, which was responsible for supporting shift operators in establishing proper maintenance boundaries, and the shift personnel reviewing and approving the tag out. Specifically, tagging office personnel had reviewed the work and incorrectly concluded that the maintenance activity would not affect the opposite train. This conclusion was based on a drawing review only; no field walkdown was performed. Licensee managers indicated that during planning discussions with tagging office personnel, the Operations Superintendent requested that a field verification be completed to ensure that the maintenance would not affect both trains simultaneously. However, tagging office personnel failed to complete this field verification. Additionally, an SRO responsible for reviewing the work walked down the maintenance in the field, but failed to identify the work's potential impact upon both SAVS trains. As corrective action, the licensee took disciplinary action against three involved employees. Also, the event and its lessons learned were reviewed in detail with all operations personnel. The inspectors noted that the licensee took a further step to ensure that communications concerning the event had been effective by directing oversight personnel to randomly quiz operations personnel concerning their knowledge of the event and its causes.

The inspectors reviewed the event and its significance. The inspectors concluded that the licensee's tests were appropriate in demonstrating continued B train SAVS operability, and accordingly, the event's direct safety significance was reduced. However, the inspectors also concluded that the maintenance planning error leading to the event was significant because redundant trains were



unknowingly affected by a maintenance activity. Both on-shift operators and operations support personnel failed to identify the potential impact of the maintenance on the opposite train. Additionally, had an inspector not intervened early in the maintenance activity, a larger opening would later have been created in the duct during actual boot replacement which had the potential to more significantly degrade the other train's performance. The potential effect of removing the boot upon system operability was not included in the licensee's operability evaluations.

The inspectors reviewed the requirements for maintenance planning. Unit 1 TS 6.8.1 required that written procedures be established, implemented and maintained including, by reference to Regulatory Guide 1.33, procedures to ensure that maintenance that can affect performance of safety-related equipment be properly pre-planned and performed. This requirement was implemented, in part, by procedure OPAP-0010, Tag-Outs, revision PN-1, section 6.3.3.c, which stated that senior operators reviewing tagging records shall verify that the tagging will maintain compliance with TS requirements including maintaining redundant equipment operable. Contrary to these requirements, at approximately 8:15 a.m. on July 16, OPAP-0010 was not properly implemented in that tagging was performed and maintenance was begun on one Safeguards Area Ventilation System train without ensuring that the maintenance would not affect the redundant equipment train. This is identified as Violation 50-338/95-15-01: Failure to Follow Procedure for Properly Controlling SAVS Maintenance.

#### 4.2 Safety Injection Valve Packing Adjustment

On August 3, the inspectors observed maintenance activities associated with 2-SI-MOV-2867A, the A train BIT inlet isolation valve. The valve developed a minor packing leak, and the maintenance was planned to tighten the valve's packing in order to stop the leakage. The maintenance was controlled under WO 00319553-01, which included work instructions to adjust the packing using O-MCM-0400-06, Adjusting Packing of Safety-Related Motor-Operated Valves, revision 2, and post-maintenance testing using O-EPM-1505-01, Thrust Measurements of Motor-Operated Valves Using the VOTES Portable Strain Indicator (P-3500), revision 3.

The inspectors reviewed work documentation at the work site and verified that maintenance activities were conducted in accordance with procedures. The inspectors found that during the actual packing adjustment, work procedures were properly updated, the torque wrench in use was properly calibrated and correctly used, and QA personnel appropriately verified torque values used in tightening the valve's packing gland nuts. The inspectors also found that during post-maintenance testing, procedures were correctly used and portable test equipment was properly calibrated and correctly used. The inspectors verified that post-maintenance

valve thrust measurements demonstrated that the valve packing adjustment had not affected operability. The inspectors concluded that the maintenance was properly performed.

The inspectors noted that the maintenance was planned to coincide with the valve's quarterly surveillance test, 2-PT-213.22, Valve Inservice Inspection (Safety Injection System), revision 4-P2. This allowed operators to gather the required post-maintenance stroke times for the valve without performing a separate test. The inspectors considered that scheduling the maintenance to coincide with the regularly scheduled PT was a good practice because it reduced the number of required system manipulations.

#### 4.3 Motor-Operated Valve Overthrust

On August 8, while performing a post-maintenance test for valves 2-CH-MOV-2286B and 2-CH-MOV-2287B, the first valve's motor breaker thermal overload device was actuated, and the second valve's motor breaker was manually tripped by technicians when high amps were observed during the close stroke. The valves were located on the discharge for charging pump 2-CH-P-1B which was out of service for maintenance. (The plant had three charging pumps, with only two required to be operable at any one time by TS.) The valves served to isolate the 2-CH-P-1B pump from its normal and alternate discharge headers and formed a safety-related pressure boundary. The normally-open valves did not have an automatic actuation function, but could be required to be shut during EOPs to isolate one of the two headers if the pump was in service as one of the two TS-required HHSI pumps.

The inspectors learned of this event on August 9 and reviewed the circumstances leading up to the error. Investigations by the licensee identified that the wiring configuration of the valves' motor operators was erroneously changed during the preventive maintenance activity for which the post-maintenance test was being conducted. The wiring modification effectively changed the valve from a limit close to a torque close configuration. Since the closing torque switches were set at maximum, the motor operators applied full torque to the valves when the valves went full shut. This had the potential to cause damage to both valves or their operators.

The inspectors obtained information which indicated the following sequence of events leading up to the error:

- In late 1994/early 1995, DCP 93-260, MOV Limit-Limit Control Circuit Wiring Modification, was implemented on several three inch Velan valves. The DCP modified the control circuit from torque closed-limit open control to limit closed-limit open control. 2-CH-MOV-2286B and 2-CH-MOV-2287B were encompassed by the modification and the

modification was completed for the two valves during the Unit 2 outage in April-May 1995.

- Field change 1 to the modification changed the setting of the torque switches (used as a backup to the limit switch) for the two valves from settings of 1.75 and 2.5, which provided backup protection, to a maximum setting of 5. The setting effectively bypassed the torque switch from the circuit. The field change was designed to prevent a premature torque switch trip and was a result of MOV testing during the Unit 2 outage.
- As part of the DCP process, procedures and drawings which were designated as priority were updated as each MOV control circuit was modified. Non-priority procedures and drawings were required to be updated within 90 days of the DCP completion and had not been updated before the August 8 error. Detailed wiring drawings, FEs, were considered as non-priority drawings and had not been updated to reflect modification DCP 93-260 by August 8 because the DCP had not been fully closed until July 1995.
- On August 8, an electrician was performing preventive maintenance using O-EPM-1503-01, Inspection of Limitorque Motor-Operated Valves, revision 0, for 2-CH-MOV 2286B and 2-CH-MOV-2287B. The procedure required that the limit switch compartment be inspected. Procedure step 6.2.4 stated, "Ensure all jumpers and other wiring terminations are landed on the correct terminals in accordance with the latest applicable control wiring drawings." When performing this step, the electrician compared the as-found wiring to drawing 12050-FE-13Q, revision 23, and found that it did not match. The electrician informed his supervisor about this condition, and with his concurrence, proceeded to rewire the MOVs to match the FE.
- Following the completion of the maintenance, operators stroked the valves to verify proper operation. Valve 2-CH-MOV-2286B was stroked first. Technicians at the breaker observed that the valve's motor was drawing approximately 13 amps when the thermal overload actuated. (The nameplate rating for the valve motor was 2.8 amps.) Operators then proceeded to stroke 2-CH-MOV-2287B. Technicians manually tripped the breaker when they observed that the second valve's motor was also drawing approximately 13 amps.
- Investigations quickly found that both valves' control circuit had been erroneously modified. Both valves were then quarantined, and an initial evaluation was conducted to verify that the valve body integrity was not compromised. The evaluation concluded that the valve bodies were not

damaged and the charging/HHSI system remained operable with the two remaining charging pumps. The affected pump remained out-of-service with the valves shut.

The inspectors discussed this event with the technician involved and licensee management. The inspectors learned that prior to the job's performance, the technician consulted the licensee's DMIS to verify that the latest revision to the electrical drawing was being used. The electrician noted that DMIS indicated that revision 23 was required, which was a later revision than the technician had at the time. The technician properly obtained revision 23 (issued in July 1995) prior to the job's performance. However, the electrician failed to recognize that the drawing had another revision pending from DCP 93-260. This was flagged by the DMIS using a plus sign under the "DOC" column on the computer screen. This flag was intended to alert personnel that other documents were present which could affect the drawing and should be reviewed before using the drawing for performing work. In this case, the final ORR for the DCP was processed on July 19, 1995, and non-priority drawings were required to be updated within 90 days of that date.

The inspectors also learned that a similar event occurred on July 11, 1995, while performing the same maintenance activity on 2-CH-MOV-2287A. For that event, DR-N-95-1191 was written to document that the FE drawing was found to be wrong during the field maintenance. During the July event, no modifications were made to the valve circuitry. The DR response stated, "There was some discussion amongst the craft at the time as to whether they should perform corrective rewiring of the MOV wiring, but did not based on a review of the elementary diagram." The higher-level elementary (ESK or logic) diagram was considered a priority drawing and had been updated when the modification was implemented. Corrective action to the DR was, in part, to discuss DMIS use with maintenance personnel during August quality maintenance training meetings. Three of five crews had completed this training, but the meeting with the crew performing the August 8 work had not yet been held. Additionally, other issues regarding FE drawing updates were brought up in May 1995 as an outage critique item, but no DR was written to bring those issues to management's attention.

Further discussions with electricians indicated that changing the wiring inside a limit switch cover to match FEs had been done several times in the past. The licensee researched the DR database for similar wiring changes and found 26 cases in the last five years. Of these 26 cases, 8 actually resulted in rewiring being done without a review such as planning via the work order process. The inspectors found that the past practices included changing the power supply leads to reflect drawing configurations. For these cases, wiring changes would have no effect on the MOVs' functions. The electrician involved with this recent event

indicated that he believed that he was only similarly changing the power supply leads, and that the change would not affect the MOV's functions.

The inspectors reviewed the licensee's completed and planned corrective actions for this event. The licensee immediately contacted the valve manufacturer on the day of the event to evaluate possible damage to the valve bodies. Initial discussion with the vendor determined that the valve bodies were not damaged and that the pressure boundary was intact. Specifically, the licensee calculated that the valves and operators were overthrust to 47,827 lbf. The three-inch Velan valve thrust design values were a continuous allowable value of 13,380 lbf and a one-time thrust allowable value of 32,000 lbf. Although the calculated value well exceeded the design parameters, the manufacturer stated that values up to at least 65,000 lbf would not damage the valve body. The actual failure value and margin to failure were proprietary information and were not provided by the manufacturer.

To recover from the over-torque and overthrust condition, the licensee planned the following corrective actions:

- Perform external valve inspections.
- Rewire the MOV in accordance with DCP 93-260.
- Open the valve while obtaining thrust values for each valve coming off the seat.
- Tear down the actuator for inspection and rebuild as necessary.
- Perform MOV VOTES and coefficient of friction testing.
- Perform a special test to verify flow characteristics.
- Perform a final MOV operability evaluation.

To address the cause for the personnel error, a "level one" root cause evaluation was initiated by the licensee. Also, on August 16, the licensee invoked a stop work day to allow managers and supervisors to discuss this event and other human performance issues (paragraph 8.2) with all station personnel. During the stop work day, senior managers spent 45 minutes with each division to discuss selected events and answer any questions. The rest of the day was used by the individual departments to discuss various items such as quality, self check, and team building. The inspectors concluded that the initiative to stop work at the station for an entire day indicated that station management was sufficiently concerned about human performance at the station. At the inspection period's end, additional corrective actions were ongoing and will continue to be followed by the inspectors.

The inspectors concluded that although the safety significance was reduced by the fact that the error had no immediate affect upon charging system operability, the above event represented a serious error with the potential to adversely affect plant operations and safety. Specifically:

- The wiring changes made during the maintenance represented a modification to the MOV's function which had been implemented without proper controls. Technicians rewiring the valve essentially made a modification to change the function of plant equipment without a proper evaluation of the modification's consequences. The operators and technicians were not cautious when they proceeded to test the second valve without fully investigating the cause for the first valve's thermal overload device actuation.
- The corrective actions from the July 11 event would probably have prevented this event had they been completed prior to the next maintenance activity performance. The corrective actions and time frame for their completion were reasonable at the time and met the licensee's requirements.
- Drawing control process problems contributed to the event. Specifically, personnel were not familiar with the information that was provided by the DMIS. Additionally, instructions in the licensee's administrative procedure, VPAP-0601, Document Distribution and Control, revision 2, did not specify that referenced information in DMIS be consulted and did not provide instructions on how to obtain the information. Also, plant administrative procedures allowed delays in updating non-priority electrical drawings. For DCP 93-260, electrical modifications were completed on some valves as early as December 1994. However, because the DCP was still open until July 1995, non-priority drawing updates were not implemented as of August 1995.

The inspectors reviewed the event's regulatory significance. 10 CFR 50, Appendix B, Criterion III, as implemented by Operational Quality Assurance Program Topical Report VEP-1-5A, UFSAR section 17.2.3, Design Control, required that all design changes and/or modifications to safety-related components described in the UFSAR be reviewed, approved, and acted upon by the SNSOC. Contrary to these requirements, on August 8, field technicians made modifications to safety-related valves 2-CH-MOV-2286B and 2-CH-MOV-2287B, without review or approval by the SNSOC. This was identified as violation 50-339/95-15-02: Two MOVs Modified Without Proper Design Change Review. Additionally, the inspectors concluded that DMIS was weak with respect to disseminating drawing update information. Specifically, personnel were not familiar with the information provided by the DMIS and administrative procedures did not provide adequate instructions for obtaining drawing update information.

Two violations were identified.

## 5. Surveillance Observations (61726)

Surveillance testing activities were observed and reviewed to verify that testing was performed in accordance with procedures, test instrumentation was calibrated, LCOs were met, and any deficiencies identified were properly reviewed and resolved.

### 5.1 Service Water Pump Test

On August 1, the inspectors observed operators performing 2-PT-75.2A, Service Water Pump (2-SW-P-1A) Quarterly Test, revision 25-P2. The test was performed to satisfy TS surveillance requirements 4.7.4.1.d and 4.0.5. The inspectors observed procedure adherence, test condition establishment, and SWPH general material conditions. The inspectors also independently recorded and evaluated pump performance data.

During the test, the operators and the inspectors noted that one of three flow versus discharge pressure measurements was found to be in the "alert" range. Additionally, the pump motor's upper bearing horizontal vibration measurement fell within the "alert" range. In accordance with the surveillance procedure, operators informed the licensee's IST engineering organization so that the test frequency could be increased. Additionally, an information action statement entry was made concerning the pump's performance falling into the "alert" range. No additional problems were noted during the test. The inspectors concluded that the test had been properly performed and that operators had taken appropriate action in response to the test results.

The inspectors further reviewed the pump's performance by obtaining and reviewing the results from previous surveillance tests performed during 1994 and 1995. The inspectors found that the pump test results had previously fallen into the "alert" range due to high vibrations at the same point during tests on August 30, 1994, and February 28, 1995. All other tests during this period were satisfactory, although recorded measurements frequently approached the "alert" range.

The inspectors reviewed the 1994 and 1995 test dates to ascertain if the test frequency had been appropriately adjusted in response to the "alert" measurements. The inspectors found that on the two past occasions where the measurements fell into the "alert" range, the licensee properly increased the pump test frequency for the next two cycles in accordance with ASME Section XI code and licensee procedural requirements. Additionally, the inspectors reviewed the 1994 and 1995 test results for the other three SW pumps. No problems were identified. The inspectors concluded that the licensee had appropriately responded to the "alert" measurements.

During the test, the inspectors noted that housekeeping in the SWPH was poor. Large quantities of spider webs and dead insects were present on valve operators and other safety-related equipment. The inspectors informed licensee management concerning this observation, and corrective actions were initiated.

## 5.2 Turbine Valve Testing

On July 28, operators observed an equipment problem while performing 1-PT-34.3, Turbine Valve Freedom Test, revision 8. The test was being conducted to satisfy TS surveillance requirement 4.7.1.7.2 which required valve cycling each 31 days to verify valve freedom. During the test, the number 2 governor valve did not initially respond to closure and then rapidly closed from 100 percent open. The valve's closure caused a 60 MWe drop in power and armed the steam dump control system.

The inspectors reviewed the licensee's investigations into the problem to ensure that the valve's function to rapidly close after a reactor trip was not adversely affected. An initial investigation concluded that the problem was most likely in the control loop, did not effect the turbine protection circuitry, and was not caused by valve binding. This conclusion was based partially upon the EHC system performance over the preceding two days. On July 27 operators observed that the EHC system cycle time (the time required for EHC pressure to drop from full pressure to the makeup setpoint) changed from greater than one minute to approximately 22 seconds. After stroking the governor valve, the cycle time returned to near normal. Based on this data, the licensee concluded that the most likely cause for the problem was a sticking EHC servo valve, which could be caused by debris or leakby in the system. The servo valve did not affect the valve's function to close rapidly after a reactor trip. The inspectors also observed a second number 2 governor valve stroke and noted normal operation. The inspectors concluded that the licensee's analysis and actions were reasonable. At the inspection period's end, the licensee was continuing to pursue this issue with the vendor and was increasing the monitoring of EHC cycle time until the next valve test.

On August 4, the same test was performed on Unit 2. The inspectors observed the test locally and from the control room. The test was performed satisfactorily, and good communications were noted both in the control room and locally at the valves.

No violations or deviations were identified.

## 6. On-site Engineering (37551)

On-site engineering activities were reviewed to determine their effectiveness in preventing, identifying and resolving safety issues, events and problems.



### Safeguards Area Ventilation System Special Tests

On July 20, the inspectors reviewed a planned special test to evaluate the impact upon SAVS operability for an event on July 16 in which the B train SAVS was potentially rendered inoperable when an inspection port was removed from the A train SAVS (paragraphs 3.3 and 4.1). The licensee modified an eighteen month surveillance test procedure and classified it as a special test under licensee administrative controls. The inspectors reviewed the special test, 1-ST-104, Safeguard Exhaust Flow Verification of 1-HV-F-40B With Inspection Port of 1-HV-F-40A Open, revision 0, and attended the SNSOC meeting which reviewed and approved the test. The test consisted of a procedure to partially remove the A train SAVS fan discharge inspection port with the B train SAVS fan running and then measure SAVS flow from the Safeguards Building. The inspectors found that the licensee had adequately considered the test's potential impact on system operability and had implemented appropriate test controls.

The inspectors attended the pre-test briefing and observed test performance on July 21. During the test, the inspectors observed that test data was properly measured and analyzed. Management attention was observed as appropriate for the special test. The test was stopped in accordance with its approved procedure when SAVS flow approached TS surveillance requirement minimum values when the inspection port was 20 percent open.

After a further review, the licensee decided to modify the special test procedure and perform the test a second time. The second special test was planned to measure the actual SAVS flow and Safeguards Building  $\Delta p$  with the inspection port fully removed. The inspectors reviewed the second test procedure, revision 1 to 1-ST-104, and observed test performance on July 24. The inspectors observed that test performance was again proper. The test results indicated that with the inspection port fully removed, TS surveillance requirement minimum ventilation flow values were achieved and a negative  $\Delta p$  was maintained in the Safeguards Building. The licensee concluded that based upon the test results, the SAVS remained operable and able to perform its design-basis functions throughout the conditions associated with the July 16 event. The inspector's observations and reviews did not identify any discrepancies with these findings. The inspectors concluded that the tests were properly performed and that management attention was appropriate.

No violations or deviations were identified.

#### 7. Plant Support Activities (71750, 81018)

Plant support activities were observed and reviewed to ensure that programs were implemented in conformance with facility policies and procedures and in compliance with regulatory requirements. Activities reviewed included radiological controls, physical security, emergency preparedness, and fire protection.

### 7.1 Security Procedure Review

On July 31, the inspectors evaluated the licensee's plans for responding to plant sabotage. The licensee provided inspectors with procedure SCPIP-18, Discovery of Suspected Sabotage Device/Evidence of Sabotage, revision 2. The inspectors reviewed the procedure and found that it provided a general plan for responding to a wide variety of sabotage events. Additionally, the inspectors discussed resources available and past problems with licensee security personnel. The inspectors concluded that the licensee maintained proper procedures available for responding to a sabotage event.

### 7.2 Security Training Program Changes

An announced meeting was conducted in the Region II Office on August 14 between licensee security representatives and regional Safeguards Specialists to discuss a proposed common security Training and Qualification Plan. The plan would apply to both Surry and North Anna. Specific items discussed included:

- Before performing assigned duties, all security personnel would be trained and qualified by shift supervisory personnel whose experience enables them to qualify security officers.
- Firearm training would be revised to incorporate random firing distance sequence verses an advancing or retreating sequence of fire.
- Requalification time for some tasks would be extended from annually to every 36 months.
- Protected Area patrols would be decreased.

No violations or deviations were identified.

## 8. Evaluation of Licensee Self-Assessment Activities (40500)

Self-assessment programs were reviewed to determine if programs contributed to the prevention of plant problems by monitoring and evaluating plant performance, providing assessments and findings, and communicating and following up on corrective action recommendations.

### 8.1 Quality Assurance Meeting

On July 20, the inspectors met with site QA organization supervisors. Issues discussed included QA activities and findings for June 1995, and QA focus areas for upcoming activities. Copies of recent QA audits and assessments were provided for review by the inspectors. The meetings continued to be informative and kept

the inspectors abreast of the licensee's self-assessment efforts and focus.

## 8.2 Management Review Board Meetings

On July 24 and 26, the inspectors attended Management Review Board meetings. These weekly meetings provided station senior managers with opportunities to review the status of selected station issues. The inspectors noted that the board reviewed the status of several significant issues including: operator simulator training improvements, overtime reviews, DR trend reports, and station performance annunciators. The inspectors found that the meetings continued to be a positive initiative by licensee management.

During the meetings and throughout the inspection period, the inspectors observed the implementation of the licensee's performance annunciator program. The program consisted of a quantitative self-assessment in numerous areas performed quarterly with the results published for the station in an annunciator window format. The inspectors noted that the preliminary results were presented to station managers for qualitative assessment prior to final issuance. During these reviews, management noted that the performance annunciators indicated a noticeable degradation in overall safety performance for 1995's second quarter. Additionally, the inspectors and senior managers discussed several significant human performance problems which had occurred since the end of the quarter.

As a direct result of the performance annunciator indicators and management's review of human performance problems, the licensee initiated numerous actions to ensure station personnel were aware of the problems and were properly focused on improving performance. The most significant action was the declaration of a "no work" day on August 16, during which station management met with all station personnel to personally discuss recent human performance problems and their expectations (paragraph 4.3). The inspectors considered that the licensee's station performance annunciator program represented a strength in self-assessment because it contributed to the identification of an undesirable trend in human performance. Additionally, station management gave appropriate attention to the program's results and initiated corrective actions.

No violations or deviations were identified.

## 9. Licensee Event Report Follow Up (92700)

The following LERs were reviewed and closed. The inspectors verified that reporting requirements had been met, causes had been identified, corrective actions were appropriate, and generic applicability had been considered.

9.1 (Closed) LER 50-339/95-01: Main Steam and Pressurizer Safety Valve Setpoints Out of Tolerance Due to Setpoint Drift

This LER concerned the fact that the setpoints for two pressurizer safety valves and two main steam safety valves were found to be outside the setpoint tolerances allowed by TSs. This was discovered during routine surveillance testing during the recent Unit 2 refueling outage. As corrective action, the licensee ensured the safety valves were refurbished and retested within allowable limits prior to reinstallation. The licensee evaluated the setpoint shifts and found that the "as found" setpoints did not place the plant outside design basis assumptions. The inspectors reviewed the event and found that the safety valve setpoint shifts were consistent with industry experience and were not safety significant. Additionally, the inspectors noted that on July 26, the licensee submitted a proposed TS amendment to increase the pressurizer safety valve lift setpoint tolerances. The inspectors concluded that the licensee's corrective actions were adequate.

9.2 (Closed) LER 50-339/95-02: Missed Surveillance on Individual Rod Position Indication Due to Personnel Error

This LER described an event on July 10, 1995, in which licensee operators identified that a plant computer point was left in a "calibration" mode for approximately nine hours starting on July 9. With the point in "calibration", the computer's automatic rod position deviation monitor function was unknowingly disabled. As a result, operators failed to meet a TS 3.1.3.2 action statement "c" requirement to manually perform a comparison every four hours during any period that the automatic rod position monitor was inoperable. Licensee personnel promptly reviewed other plant computer printouts and also identified a second similar event earlier on July 9 in which the function had been disabled for approximately twelve hours and no manual comparison was performed.

The licensee performed an investigation into the events' causes and identified two different personnel errors that caused the computer points to be disabled. Both errors occurred during routine IRPI calibrations performed on July 9 following a unit power transient for condenser water box maintenance. During the IRPI calibration, rods in calibration were required by procedure to be removed from computer scanning. Twice during these calibrations, technicians failed to properly return the computer to normal following IRPI calibrations. Additionally, a third error in plant computer manipulation was identified, but this error had no effect upon computer operation. The personnel errors were caused by a combination of inattention to detail and a poor supporting procedure.

To correct the events' causes, the licensee coached the individual technicians performing the calibrations on the importance of procedure implementation and self checking. The event and lessons learned were reviewed with all I&C personnel, and the procedure was revised to require written verification for returning the computer to normal following IRPI calibrations. On July 24, the inspectors met with licensee supervisors and reviewed in detail the event and verified the corrective action implementation. The inspectors noted that the event had low safety significance because the licensee was able to confirm through operator logs and observations that rods remained properly positioned throughout the time periods involved. The inspectors concluded that the licensee had properly investigated the event and taken appropriate corrective action.

The inspectors reviewed the TS requirements associated with the events. TS 3.1.3.2.c required the licensee to maintain rod position indicating systems operable including the automatic rod position deviation monitor. TS 3.1.3.2 action statement "c" required that with the automatic rod position deviation monitor inoperable, demand and IRPI channels be compared every four hours. Contrary to these requirements, on two occasions (from 1:22 a.m. to 1:39 p.m. on July 9, and from 4:15 p.m. on July 9, to 1:56 a.m. on July 10) the automatic rod position deviation monitor was inoperable, and the licensee failed to compare the demand and IRPI channels every four hours. This licensee-identified and corrected violation is being treated as a non-cited violation, consistent with Section VII of the NRC Enforcement Policy. This non-cited violation is identified as NCV 50-339/95-15-03: Two Failures to Complete RPI TS Action Statement Requirements Due to Personnel Error. This non-cited violation is considered to have occurred in the maintenance area.

One non-cited violation was identified.

10. Previous Inspection Item Follow Up (92901)

The following previous inspection item was reviewed and closed. The licensee's actions in response to the violation were reviewed to establish that corrective actions had been completed and that programs and practices had been strengthened to prevent recurrence.

(Closed) VIO 50-338, 339/94-10-01: Inoperable Hydrogen Analyzer

This violation concerned an inoperable Unit 1 containment hydrogen analyzer. The licensee identified that a mechanical fitting had failed and caused the analyzer to be inoperable from February 4 to April 26, 1994. Immediate actions were to tighten the degraded Unit 1 analyzer sample line fitting and to verify that the Unit 2 analyzer was operable. Associated LER 50-338, 339/94-03, Containment Hydrogen Analyzer Inoperable due to a Failed Tubing Fitting, was previously reviewed and closed in NRC Inspection Report Nos. 50-338, 339/94-10.

The inspectors reviewed the licensee's response to determine whether appropriate corrective actions had been implemented. The NOV response clearly documented the failure's cause and corrective actions taken to preclude recurrence. The inspectors reviewed procedure ICP-HC-1-H2A-101, Containment Hydrogen System Reactor Containment Hydrogen Analyzer, revision 7-P1, and verified that revisions were implemented to eliminate unnecessary manipulations of the sample line fittings and to perform a leak check on fittings which were manipulated during the calibration procedure. The degraded Unit 1 analyzer sample line fitting was also replaced under WO 288221-01. During their reviews, the inspectors noted an administrative error in the licensee's response to the violation concerning the TS LCO which applied to the situation. The inspectors informed the licensee concerning this finding which did not effect the quality of causal analysis or corrective actions. The inspectors concluded that the licensee's NOV response dated July 5, 1994, and corrective actions were appropriate and had been properly implemented.

No violations or deviations were identified.

#### 11. Exit Interview

The results were summarized on August 22, 1995, with those persons identified in paragraph 1. The inspectors described the areas inspected and discussed in detail the inspection results addressed in the Summary section and those listed below.

<u>Type</u>	<u>Item Number</u>	<u>Status</u>	<u>Description</u>
VIO	50-338/95-15-01	Open	Failure to Follow Procedure for Properly Controlling SAVS Maintenance (paragraph 4.1)
VIO	50-339/95-15-02	Open	Two MOVs Modified Without Proper Design Change Review (paragraph 4.3)
NCV	50-339/95-15-03	Closed	Two Failures to Complete RPI TS Action Statement Requirements Due to Personnel Error (paragraph 9.2)
VIO	50-338, 339/94-10-01	Closed	Inoperable Hydrogen Analyzer (paragraph 10)
LER	50-339/95-01	Closed	Main Steam and Pressurizer Safety Valve Setpoints Out of Tolerance Due to Setpoint Drift (paragraph 9.1)

<u>Type</u>	<u>Item Number</u>	<u>Status</u>	<u>Description</u>
LER	50-339/95-02	Closed	Missed Surveillance on Individual Rod Position Indication Due to Personnel Error (paragraph 9.2)

Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

## 12. Index of Acronyms

$\Delta P$	DIFFERENTIAL PRESSURE
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
BIT	BORON INJECTION TANK
CFR	CODE OF FEDERAL REGULATIONS
DCP	DESIGN CHANGE PACKAGE
DMIS	DOCUMENT MANAGEMENT INFORMATION SYSTEM
DR	DEVIATION REPORT
ECCS	EMERGENCY CORE COOLING SYSTEM
EDG	EMERGENCY DIESEL GENERATOR
EDSFI	ELECTRICAL DISTRIBUTION SYSTEM FUNCTIONAL INSPECTION
EHC	ELECTRO-HYDRAULIC CONTROL
EOP	EMERGENCY OPERATING PROCEDURE
ESK	ELECTRICAL SKETCH
FE	WIRING DIAGRAM
FR	FEDERAL REGISTER
HHSI	HIGH-HEAD SAFETY INJECTION
I&C	INSTRUMENTATION AND CONTROLS
IRPI	INDIVIDUAL ROD POSITION INDICATION
IST	INSERVICE TESTING
LBF	POUNDS-FORCE
LCO	LIMITING CONDITION FOR OPERATION
LER	LICENSEE EVENT REPORT
LOCA	LOSS OF COOLANT ACCIDENT
MOV	MOTOR OPERATED VALVE
MWe	MEGAWATTS ELECTRICAL
NCV	NON-CITED VIOLATION
NO.	NUMBER
NOV	NOTICE OF VIOLATION
NRC	NUCLEAR REGULATORY COMMISSION
OP	OPERATING PROCEDURE
ORR	OPERATIONAL READINESS REVIEW
PT	PERIODIC TEST
QA	QUALITY ASSURANCE
RPI	ROD POSITION INDICATION
SAVS	SAFEGUARDS AREA VENTILATION SYSTEM
SFP	SPENT FUEL POOL
SNSOC	STATION NUCLEAR SAFETY AND OPERATING COMMITTEE
SRO	SENIOR REACTOR OPERATOR
SW	SERVICE WATER

SWPH	SERVICE WATER PUMP HOUSE
TS	TECHNICAL SPECIFICATION
UFSAR	UPDATED FINAL SAFETY ANALYSIS REPORT
VIO	VIOLATION
VOTES	VALVE OPERATION TEST AND EVALUATION SYSTEM
WO	WORK ORDER