

U.S. NUCLEAR REGULATORY COMMISSION

REGION II

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Report No: 50-280/97-12, 50-281/97-12

Licensee: Virginia Electric and Power Company (VEPCO)

Facility: Surry Power Station, Units 1 & 2

Location: 5850 Hog Island Road  
Surry, VA 23883

Dates: November 16 - December 27, 1997

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## EXECUTIVE SUMMARY

Surry Power Station, Units 1 & 2  
NRC Inspection Report Nos. 50-280/97-12, 50-281/97-12

This integrated inspection included aspects of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of resident inspection and includes the results of announced inspections by a regional radiation specialist and a regional reactor inspector. In addition, the report includes the results of an inoffice review by a regional reactor inspector.

### Operations

- A violation was identified for the failure to have appropriate instructions available to return the Alternate Alternating Current Diesel Generator to service following maintenance activities. This condition resulted in the generator being unavailable to automatically connect to the station electrical busses for a period of approximately 36 hours (Section 01.2).
- A violation was identified involving the failure to properly perform the verification that the Alternate Alternating Current Diesel Generator breaker control switches were in the Auto-after-Trip position as required by operator logs (Section 01.2).
- While returning the Alternate Alternating Current Diesel Generator to service, the operating crews demonstrated a willingness to accept inadequate instructions and exhibited a lack of attention to detail and questioning attitude. This evolution also revealed a weakness in the control of trainees by qualified watchstanders (Section 01.2).
- The plant response to a Unit 2 manual reactor trip was normal except for a problem with control rod indications. With the unit stabilized at hot shutdown, inattention of the operating crew to plant conditions resulted in steam generator power operated relief valve actuations. Maintenance items identified following the trip were corrected prior to restart of the unit (Section 01.3).
- The shift brief prior to startup and operator performance while taking the Unit 2 reactor critical were excellent (Section 01.3).
- Management's decision to hold Unit 2 power at approximately 35% while resolving issues with an Anticipated Transients Without Scram Mitigating System Actuation Circuitry setpoint and with the Turbine Driven Auxiliary Feedwater Pump was conservative and demonstrated a good safety perspective (Section 01.3).

### Maintenance

- A violation was identified for failure to perform post maintenance testing which was specified in work instructions for the Unit 2 Turbine Driven Auxiliary Feedwater Pump governor replacement (Section M1.1).

- Maintenance activities involving emergency diesel generator radiator louvers, control room chiller, and the screen wash system were completed in a thorough and professional manner. Maintenance personnel were knowledgeable of the assigned tasks, procedures were detailed and actively used on the job, and cooperation and coordination between various plant groups were good (Section M1.2).
- Surveillance activities involving the control room chillers, an emergency service water pump, and the turbine driven auxiliary feedwater pump were completed in a thorough and professional manner. Maintenance personnel were knowledgeable of the assigned tasks, procedures were detailed and actively used on the job, and cooperation and coordination between various plant groups were good (Section M1.3).
- A non-cited violation was identified for failing to test the remote manual undervoltage trip prior to placing the reactor trip bypass breakers inservice as required by Technical Specifications (Section M8.1).
- The operating experience review staff failed to recognize the applicability of improper reactor trip bypass breaker testing to Surry after this issue was identified in October 1996 at the licensee's North Anna Station (Section M8.1).

#### Engineering

- The total number of temporary modifications, four on Unit 1 and none on Unit 2, indicated a willingness to correct problems in an expeditious manner. The temporary modifications had safety evaluations which were completed prior to installation (Section E1.1).

#### Plant Support

- Health physics practices were observed to be proper (Section R1.1).
- The licensee's program for transportation of radioactive materials had been effectively implemented pursuant to Department of Transportation and NRC regulations. Enhanced procedures for shipping radioactive materials were found to be a program strength (Section R1.2).
- The licensee's water chemistry control program for monitoring primary and secondary water quality had been implemented in accordance with the Technical Specification requirements and industry guidelines for pressurized water reactor water chemistry (Section R1.3).
- The licensee had implemented and maintained a program for obtaining and analyzing samples of reactor coolant and containment atmosphere under accident conditions in accordance with Technical Specification requirements and Updated Final Safety Analysis Report commitments (Section R1.4).

- Security and material condition of the protected area perimeter barrier were acceptable (Section S1).

## Report Details

### Summary of Plant Status

Unit 1 operated at power the entire reporting period.

Unit 2 operated at power until December 2 when the unit was manually tripped by the operating crew (See Section 01.3). The unit was returned to service on December 3 and achieved 100 percent power on December 6. The unit operated at or near power for the remainder of the inspection period.

### I. Operations

#### 01 Conduct of Operations

##### 01.1 General Comments (40500, 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 Technical Specifications (TSs). 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. Deviation Reports (DRs) were reviewed to assure that potential safety concerns were properly reported and resolved. The inspectors found that daily operations were generally conducted in accordance with regulatory requirements and plant procedures.

##### 01.2 Inoperable Alternate Alternating Current (AAC) Diesel Generator (DG)

###### a. Inspection Scope (71707)

The inspectors reviewed the circumstances surrounding a failure to ensure that the AAC DG was properly aligned following return to service.

###### b. Observations and Findings

On November 25, the AAC DG was tagged out for preventative maintenance activities on the associated electrical busses and breakers. On November 26, at 10:30 p.m., maintenance activities were completed, the associated tagout was cleared and the AAC DG was returned to service in accordance with Procedure O-MOP-AAC-002, "Return to Service of the AAC Diesel Generator." Based on the maintenance activities performed the licensee determined that an AAC DG run was not required to return the diesel to an operable status.

On November 28, during the performance of the quarterly AAC DG test, six breaker control switches were found in the Pull-to-Lock (PTL) position. With the switches in the PTL position the AAC DG would not have automatically aligned to the associated station busses. The switches were returned to Auto-after-Trip and the quarterly AAC DG test was subsequently performed satisfactorily.

Although not addressed in TS, the AAC DG was installed to meet regulatory requirements. Consequently, the licensee has established a 14 day administrative limit for the allowed outage time of the AAC DG. The 14 day administrative limit was not exceeded during the time frame that the AAC DG was inoperable.

The switches found in the PTL position were not addressed in Procedure 0-MOP-AAC-002. The tagout associated with the maintenance activity (SO-97-AAC-006) had a hand written note in the comments section that stated "ensure all switches that have a Pull-to-Lock position are left in auto after clearing tagout. This applies to 0-AAC-BKR-M1, 0-AAC-BKR-M2, 0-AAC-BKR-M3, 0-AAC-BKR-L2, 0-AAC-BKR-L3, they are not addressed by MOP." The switches were not included in the actual tagout portion of the clearance. The tagout comment listed, by equipment number, the breakers that are controlled by the switches, but did not provide the applicable switch equipment numbers. The tagout comment did not mention that the actual switches which had the PTL feature were located on a panel that was separate from the actual breakers listed in the tagout comment. In addition, the tagout comment did not identify all the switches that were subsequently found out of position. The operators performing the return to service did not have a good understanding of the AAC DG and associated system controls. The operators did not question that the test switches they verified (located on the breakers and referenced in the comments section of the tagout) did not contain a PTL position. This discrepancy was not identified to the operator's supervisor. While returning the AAC DG to service the operators did not check the control switches with the PTL feature that were located on another panel.

Technical Specification 6.4.A.7 requires that detailed written procedures with appropriate check-off lists and instructions be provided for preventive or corrective maintenance activities which would have an effect on the safety of the reactor. Procedure 0-MOP-AAC-002 and Tagout SO-97-AAC-006 did not contain appropriate check-off lists and instructions to return the AAC DG to service following maintenance activities. The failure to have detailed written procedures and appropriate check-off lists to return the AAC DG to service is identified as Violation 50-280, 281/97012-01.

The inspectors reviewed the operator logs associated with the AAC DG. Procedure "Outside Log" required that the following switches be verified in the Auto-after-Trip position on a daily basis: 0-AAC-1-05M3, 0-AAC-1-05L2, 0-AAC-1-05L3, 0-AAC-1-05L1, and 0-AAC-1-05M1. The operator logs performed on November 27 did not identify that the switches were in the PTL position. Discussions with the Operations Department determined that the AAC DG logs were taken by a trainee on November 27 with a qualified operator present. The qualified operator was in the room but did not directly observe the trainee when the logs were taken. If the operator had properly performed his log taking responsibilities the inoperable AAC DG would have been identified on November 27. The failure to follow the requirements of Procedure "Outside Log" is identified as Violation 50-280, 281/97012-02.

The licensee initiated a Category 2 Root Cause Evaluation following discovery of the mispositioned switches. The licensee had not completed the evaluation by the end of the inspection period.

c. Conclusions

A violation was identified for the failure to have appropriate instructions available to return the Alternate Alternating Current Diesel Generator to service following maintenance activities. This condition resulted in the generator being unavailable to automatically connect to the station electrical busses for a period of approximately 36 hours.

A violation was identified involving the failure to properly perform the verification that the Alternate Alternating Current Diesel Generator breaker control switches were in the Auto-after-Trip position as required by operator logs.

While returning the Alternate Alternating Current Diesel Generator to service, the operating crews demonstrated a willingness to accept inadequate instructions and exhibited a lack of attention to detail and questioning attitude. This evolution also revealed a weakness in the control of trainees by qualified watchstanders.

01.3 Unit 2 Reactor Trip and Restart

a. Inspection Scope (71707)

The inspectors reviewed the activities associated with a Unit 2 manual reactor trip.

b. Observations and Findings

On December 2, Unit 2 was manually tripped from 100 percent power when Annunciator H-A-8, "Main Steam Trip Valve Closed," was received in the control room and the reactor operator observed that the "A" Main Steam Trip Valve (MSTV) indicated an intermediate position. The unit was stabilized at hot shutdown. During the reactor trip, six control rods did not indicate less than 10 steps as required by Emergency Operating Procedures (EOPs) and the Reactor Coolant System (RCS) was bled an additional 1100 gallons as required by the EOPs. All six control rod indications drifted to zero steps following the reactor trip. Both source range instruments automatically energized as designed when power decreased into the source range.

Following the unit stabilization at hot shutdown, the "A" and "B" Steam Generator Power Operated Relief Valves (PORVs) opened automatically due to a RCS temperature increase. The operators lowered RCS temperature to terminate the PORV actuations. Through interviews with the operators, the inspectors determined that inattention of the operating crew to

plant conditions and equipment status caused the unintended RCS temperature increase and resulting steam generator PORV actuations.

The "A" MSTV did not close during the event. Inspection of the "A" MSTV determined that the open limit switch arm was displaced below the valve position arm resulting in an intermediate indication in the control room and the annunciator alarm. When the limit switch was reset, the limit switch arm and valve position arm had marginal overlap. Prior to returning the unit to service, the limit switch mounting was modified to provide more contact area. The reason the switch became disengaged from the valve position arm could not be determined. However, insulation work on the "A" MSTV was thought to be a potential contributor to the malfunction.

The six rod position indicators that did not indicate less than 10 steps following the reactor trip were calibrated prior to restart of the unit.

The unit was returned to service at 11:42 p.m. on December 3. The inspectors observed the reactor startup. The shift briefing prior to startup and operator performance while taking the reactor critical were excellent. Following the return to service of the unit, power was maintained at approximately 35 percent to resolve an issue with the Anticipated Transients Without Scram Mitigating System Actuation Circuitry (AMSAC). AMSAC is not required below 40 percent reactor power. The licensee had previously identified that the system may not automatically enable prior to 40 percent reactor power based on the fact that the enable setpoint actuates off turbine first stage pressure. This item was discussed in more detail in NRC Inspection Report Nos. 50-280, 281/97-10. The licensee lowered the AMSAC enable setpoint to ensure that the system would enable prior to 40 percent reactor power.

While the unit was holding at 35 percent power to resolve AMSAC enable setpoint concerns, the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) was tested as required by the TS. During the test, the turbine tripped on overspeed. The licensee decided to maintain power at 35 percent power until the cause of the turbine overspeed was identified and corrected. The TDAFWP trip is discussed in more detail in Section M1.1. The unit was returned to 100 percent power on December 6, following the replacement of the TDAFWP governor.

c. Conclusions

The plant response to a Unit 2 manual reactor trip was normal except for a problem with control rod indications. With the unit stabilized at hot shutdown, inattention of the operating crew to plant conditions resulted in steam generator power operated relief valve actuations. Maintenance items identified following the trip were corrected prior to restart of the unit.

The shift brief prior to startup and operator performance while taking the reactor critical were excellent.



Management's decision to hold power at approximately 35% while resolving issues with an Anticipated Transients Without Scram Mitigating System Actuation Circuitry setpoint and with the Turbine Driven Auxiliary Feedwater Pump was conservative and demonstrated a good safety perspective.

## 08 Miscellaneous Operations Issues (90712)

- 08.1 (Closed) Licensee Event Report (LER) 50-280, 281/97010-00: Missed fire protection surveillance due to personnel error. This event was discussed in NRC Inspection Report Nos. 50-280, 281/97-10 and resulted in the issuance of a Non-cited Violation. The inspectors reviewed the LER and determined that the report adequately described the event and associated corrective actions.

## II. Maintenance

### M1 Conduct of Maintenance

#### M1.1 Unit 2 Turbine Driven Auxiliary Feedwater Pump (TDAFWP) Overspeed Trip

##### a. Inspection Scope (61726) (62707)

The inspectors reviewed a overspeed trip event of the Unit 2 TDAFWP during testing.

##### b. Observations and Findings

On December 4, following the return of Unit 2 to operational status, a TDAFWP performance test was conducted in accordance with Procedure 2-OPT-FW-003, "Turbine Driven Auxiliary Feedwater Pump 2-FW-P-2." The Unit 2 TDAFWP operated normally for approximately one minute, and then began to experience divergent speed oscillations which resulted in an overspeed trip.

Subsequent to the TDAFWP trip, the licensee started the TDAFWP several times, and no overspeed trips occurred. However, computer traces of the TDAFWP's speed indicated an instability in the operation of the TDAFWP governor as indicated by convergent oscillations at low speeds. The licensee replaced the TDAFWP governor and tested the TDAFWP satisfactorily on December 6.

An in depth review by the licensee revealed that the Unit 2 TDAFWP governor had been replaced during the October 1997 Refueling Outage. The governor was replaced in accordance with Work Order 00310109-01 and Procedure 0-MCM-1403-01, "Terry Turbine Overhaul, 1-FW-T-2 and 2-FW-T-2," Revision 8. An examination of the maintenance documentation revealed that Section 6.12 (Governor Post-Maintenance and Operational Checks) of Procedure 0-MCM-1403-01 had not been performed although it was designated as a post maintenance test requirement in Work Order 00310109-01. Specifically, Section 6.12 of Procedure 0-MCM-1403-01 provided instructions to perform final tuning/adjustment of the governor

following installation and/or maintenance. These instructions had been added earlier as corrective actions for previous problems experienced with the TDAFWP governors.

The Unit 2 TDAFWP was tested satisfactorily following the October 1997 Refueling Outage. An examination of the speed traces taken during this test did not reveal a governor malfunction. On December 2, during the manual reactor trip from 100 percent power, the TDAFWP automatically started and injected as expected. Based on the inspectors' and licensee's review of these circumstances, past inoperability (from the refueling outage until the December 4 TDAFWP trip) could not be conclusively demonstrated.

The failure to perform adjustments to the Unit 2 TDAFWP governor in accordance with Section 6.12 of Procedure 0-MCM-1403-01 prior to returning the machine to service is a failure to follow safety related work procedures. This is a violation of TS 6.4.A.7 and will be tracked as Violation 50-281/97012-03.

c. Conclusions

A violation was identified for failure to perform post maintenance testing which was specified in work instructions for the Unit 2 Turbine Driven Auxiliary Feedwater Pump governor replacement.

M1.2 Maintenance Observations

a. Inspection Scope (62707)

The inspectors observed all or portions of and/or reviewed documentation for the Work Orders (WOs) and the Design Change Packages (DCPs) discussed below.

b. Observations and Findings

Emergency Diesel Generator (EDG) No. 1 Radiator Louvers

The inspectors observed the licensee initiate a troubleshooting process in accordance with WO 003730130, Troubleshoot/Repair East Louver Control. The WO contained very specific instructions from the system engineer for the troubleshooting process. The process was performed in accordance with 0-ECM-0701-01, "Emergency Diesel Generator Maintenance," Revision 4. The inspectors reviewed the WO and procedure which were present and followed at the jobsite. The system engineer was present to support maintenance and observe work progress. The inspectors observed that the craft were methodical and professional in performance of their duties and coordination between maintenance, engineering and operations was good. The problem was identified as a feedback circuit in the actuator. A new actuator was tested and installed. Subsequently, the east EDG radiator louvers functioned correctly during the post-maintenance test.

In conjunction with the above maintenance activities, the licensee implemented DCP 94-011.27 using WO 00377350-01, WO 00377350-02 and a generic procedure, "Standing MI Low Voltage Modifications Surry/Units 1&2." The inspectors reviewed portions of the design package and determined that the safety evaluation was appropriate. The modification involved the removal of a capacitor in the louver control circuit which was initially intended to act as an arc suppressor. The vendor indicated that arc suppression was not needed and the capacitors might cause harm to internal switches. The vendor, Barber-Colman, recommended removal of the capacitors.

#### Control Room and Emergency Switchgear Room Chillers

The inspectors observed Preventative Maintenance (PM) activities performed on Control Room Chiller 1-VS-E-4B. The PM was performed in accordance with WO 00373029-01 and Procedure 0-MCM-0814-01, "Control Room Chiller Maintenance," Revision 1. The PM involved the change out of compressor oil, inspection and cleaning of oil and suction strainers, and cleaning of the reservoir. The inspectors determined that the procedure was at the jobsite and was followed, the procedure instructions were thorough, and the technicians were knowledgeable of the assigned task. Also, foreign material exclusion control was maintained while the chiller was open.

#### Screen Wash Pump 2A Discharge Check Valve

The inspectors observed maintenance personnel replacing a check valve in the discharge piping of Screen Wash Pump 2A. The check valve was stuck open causing Pump 2A to spin backwards when parallel Pump 2B was operated. The job was performed in accordance with WO 00373932. The valve was a flanged connection and involved removal of eight bolts in each flange and a spool piece between the pump expansion joint and the valve. Work instructions were adequate and followed, personnel were knowledgeable of the task and engineering support was evident from valve specifications and torque tables being included in the work package.

#### Screen Wash Pump 2A Motor Replacement

The inspectors observed replacement of the Screen Wash Pump 2A Motor which had shorted out when the licensee attempted to run the motor after the maintenance on the discharge check valve. The licensee stated that there was not an apparent connection between the failure and the previous maintenance. The work was performed in accordance with Urgent WO 00379533-01 and Electrical Corrective Maintenance Procedure 0-ECM-1404-02, "Low Voltage Motor Maintenance," Revision 1. The work package was maintained at the jobsite and was followed. Good coordination was noted between electrical and mechanical groups. Welders were available as needed to remove the pump to motor coupling. The job was difficult due to severe corrosion resulting from the salt water environment but was thoroughly performed.

### Replace High Level Intake Structure Level Probe

The inspectors observed the licensee change out the high level intake structure level probe in accordance with WO 00376855-01. Previous failures of these probes due to biofouling resulted in the licensee changing out the Unit 2 probe to monitor probe function and the degree of biofouling. The response time of the old probe was measured at 31 seconds before removal. After installation, the new probe's response time was 26 seconds. The acceptance limit for response time was less than 66 seconds.

The inspectors observed that safety measures and foreign material exclusion control were in force at the jobsite. Change-out of the probes involved sending divers into high level screen wash well 2A to remove the bottom bracket of the probe and sending a technician into the well to remove the upper bracket. Communication was maintained with these personnel at all times and appropriate safety lines were used. Tools used in the well were tethered and an inventory maintained. Also, a guard was posted at the entrance to the well while the floor grating was removed. The various groups involved in the job were well coordinated and knowledgeable of their assigned tasks. The inspectors verified that procedures were at the jobsite and followed.

#### c. Conclusions

Maintenance activities involving emergency diesel generator radiator louvers, control room chiller, the screen wash system, and the high level intake structure level probe were completed in a thorough and professional manner. Maintenance personnel were knowledgeable of the assigned tasks, procedures were detailed and actively used on the job, and cooperation and coordination between various plant groups were good.

### M1.3 Surveillance Observation

#### a. Inspection Scope (61726)

The inspectors observed all or portions and/or reviewed documentation for the surveillance activities discussed below.

#### b. Observations and Findings

##### Control Room Chiller Performance Tests

The inspectors observed performance testing of Control Room Chillers 1-VS-E-4B and 1-VS-E-4D in accordance with Procedure 0-MPM-0210-01. This procedure provided instructions for verifying chiller and service water temperature and pressure parameters and is performed three times a week for early indication of chiller problems. The procedure was thorough and provided acceptable ranges for the various parameters. This test also served as a post maintenance test for the chiller PM. The inspectors observed that the procedure was at the jobsite and was

followed, technicians were knowledgeable of their assigned tasks and results were documented.

#### Emergency Service Water Pump Diesel

The inspectors observed the check out of the diesel for Emergency Service Water Pump 1-SW-P-1C in accordance with Procedure 0-MCM-0703-01. This test was a combined effort by Operations, Electrical and Mechanical Maintenance, and the vendor representative. The inspectors observed engine preparation for start-up, inspection of the engine after start, adjustment of the idle speed, verification of valve clearance and verification that the air shutdown valve would manually trip the engine. The test was thorough and well monitored. Personnel were knowledgeable of the task, and coordination between groups was good.

#### Auxiliary Feedwater System

The inspectors observed the functional checkout of the TDAFWP in accordance with Procedures 1-OPT-FW-003 and 1-OPT-FW-007. The inspectors attended the pre-job briefing and determined that the briefing was thorough and complete. Procedures were walked through and responsibilities were identified. The inspectors observed the periodic testing of the TDAFWP including verification of steam supply check valve full flow and backseating, the stroke time of the steam admission valves, vibration measurements and pump flow and pressure measurements using the recirculation flow path. All parameters were in the acceptable range and the test was successfully completed. Coordination between various plant groups was good.

#### c. Conclusions

Surveillance activities involving the control room chillers, an emergency service water pump, and the turbine driven auxiliary feedwater pump were completed in a thorough and professional manner. Maintenance personnel were knowledgeable of the assigned tasks, procedures were detailed and actively used on the job, and cooperation and coordination between various plant groups were good.

#### M8 Miscellaneous Maintenance Issues (92700)

- M8.1 (Closed) LER 50-280, 281/97011: Improper bypass breaker testing due to inadequate definition of "in service." This LER reported the failure to perform a surveillance test required by TS 4.1.A and TS Table 4.1-1, item 36. More specifically, the licensee was not testing the remote manual undervoltage trip prior to placing the reactor trip bypass breakers in service as required by TS. Rather, the licensee was testing the remote manual undervoltage trip after placing the breaker(s) in service. This matter was discovered at a Management Safety Review Committee Meeting during a discussion of a similar matter related to an occurrence at the licensee's North Anna Power Station (Reported to the

NRC in LER 338, 339/96009). The operating experience review staff failed to recognize the applicability of improper reactor trip bypass breaker testing to Surry after this issue was identified in October 1996 at the licensee's North Anna Station.

As corrective action for this matter, the licensee performed the following; 1) a station deviation report was issued to document the matter, and 2) the surveillance testing procedures (for both Unit 1 and 2) were revised to provide instructions to test the remote manual undervoltage trip prior to placing the reactor trip bypass breaker(s) in service. The inspectors observed the testing of the Unit 1 reactor trip bypass breakers following the revision of the surveillance testing procedure. The remote manual undervoltage trip was tested prior to placing the reactor trip bypass breakers in service.

Failure to test the remote manual undervoltage trip prior to placing the reactor trip bypass breakers in service is a violation of TS 4.1.A, Table 4.1-1, item 36. This non-repetitive, licensee identified and corrected violation is being treated as a Non-cited Violation (NCV) consistent with Section VII.B.1 of the NRC Enforcement Policy. This matter is identified as NCV 50-280, 281/97012-04.

### III. Engineering

#### E1 Conduct of Engineering

##### E1.1 Temporary Modifications

###### a. Inspection Scope (37551)

The inspectors reviewed the active Unit 1 and Unit 2 Temporary Modifications (TMs).

###### b. Observations and Findings

At the end of the inspection period Unit 1 had four active TMs installed and Unit 2 had no active TMs. The inspectors verified that safety evaluations had been performed and approved for all the active TMs prior to installation of the TM and that the operators were aware of the installed TMs.

###### c. Conclusions

The total number of temporary modifications, four on Unit 1 and none on Unit 2, indicated a willingness to correct problems in an expeditious manner. The temporary modifications had safety evaluations performed prior to installation.

#### IV. Plant Support

### R1 Radiological Protection and Chemistry Controls

#### R1.1 General Comments (71750)

On numerous occasions during the inspection period, the inspectors reviewed Radiation Protection (RP) practices including radiation control area entry and exit, survey results, and radiological area material conditions. No discrepancies were noted, and the inspectors determined that RP practices were proper.

#### R1.2 Transportation of Radioactive Materials

##### a. Inspection Scope (86750)

The inspectors reviewed selected elements of the licensee's program for transportation of radioactive materials to determine whether the licensee properly processes, packages, stores, and ships radioactive materials and whether the changes to the Department of Transportation (DOT) and NRC regulations, which became effective on April 1, 1997, had been implemented. The review included records for training of personnel on the changes to the regulations, procedures for preparing radioactive material for shipment, and shipping papers for selected recent shipments. Those procedures and records were evaluated for consistency with the requirements delineated in 49 CFR Parts 170 - 179, 10 CFR Part 20, and 10 CFR Part 71 for licensed material transported outside the confines of the plant.

##### b. Observations and Findings

The inspectors reviewed the training records for selected individuals authorized to sign shipping papers and determined that training on the changes to the regulations had been provided during February, June and August 1996, i.e., prior to the effective date of the changes. The selected individuals included two Health Physics (HP) area supervisors and two HP technicians. The manuals for the above training were also reviewed and found to have specifically addressed the new rules for the following topics: Low Specific Activity (LSA) and Surface Contaminated Object (SCO) hazards, definitions, and requirements; placarding, labeling, and marking of vehicles and packages; use of *Systems Internationals* (SI) units on shipping papers, labels, and emergency response instructions; package selection; waste classification; shipping papers; and receipt procedures and surveys. The inspectors reviewed HP Procedures HP-1071.021, 1071.030, 1071.040, 1072.010, 1072.020, 1072.030, 1072.040, 1072.050, and 1072.060 and determined that the instructions therein were consistent with applicable DOT and NRC requirements for selection of an acceptable container for various types of materials, LSA and SCO classifications, vehicle placarding, package marking and labeling, use of SI units, contamination and radiation levels, shipping papers, vehicle inspection, driver's instructions, emergency response information, and material receipt. The inspectors

noted that the procedures included attachments for specific types of shipments which delineated the pertinent requirements applicable to the material and/or shipment type and checklists for assuring that each of the requirements were met. The licensee indicated those attachments were developed to provide the individuals involved in the preparation of shipments with a readily available listing of the applicable requirements. Implementation of enhanced procedures for shipping radioactive materials was deemed by the inspectors to be a program strength.

The licensee used computer programs (RADMAN) for guidance in preparing radioactive materials for shipment and for generating shipping papers. Those programs included libraries of  $A_1$  and  $A_2$  values, i.e., radio nuclide activity levels used for selection of proper shipping packages. The inspectors verified that the  $A_1$  and  $A_2$  values for five selected radio nuclides listed in those libraries were accurate.

The licensee's shipment logs indicated that, as of mid-November, the licensee had made 78 shipments of radioactive material this year. The inspectors reviewed the shipping papers for four recent shipments consisting of: liquid waste shipped to a licensed waste processor; dry active waste shipped to a licensed waste processor for volume reduction; a cask of resin shipped for disposal; and contractor owned outage related tools returned as SCOs. The information on the shipping papers was found to be consistent with applicable DOT and NRC requirements and the licensee's procedures.

The inspectors toured interior and exterior storage areas used for temporary storage of packaged low-level radwaste awaiting shipment, radwaste awaiting further processing, or slightly contaminated equipment held for reuse. The inspectors noted that the containers were appropriately labeled. During the inspection the inspectors called the emergency response telephone number listed on the shipping papers for a shipment which was currently in transit and determined that emergency response and incident mitigation information was readily available.

c. Conclusions

The licensee had effectively implemented a program for transportation of radioactive materials pursuant to DOT and NRC regulations. Enhanced procedures for shipping radioactive materials was found to be a program strength.

R1.3 Water Chemistry Controls

a. Inspection Scope (84750)

The inspectors reviewed implementation of selected elements of the licensee's water chemistry control program for monitoring primary and secondary water quality. The review included examination of program guidance and implementing procedures, and analytical results for selected chemistry parameters. Those procedures and data were compared



to the requirements in TSs 3.1 D, 3.1.F and 4.1 C for monitoring specific primary coolant chemistry parameters and to the programmatic requirements, delineated in License Condition 3.K, for monitoring secondary water chemistry.

b. Observations and Findings

The inspectors reviewed Virginia Power Administrative Procedure (VPAP) 2201, "Nuclear Plant Chemistry Program", Revision No. 2, and determined that it included provisions for sampling and analyzing reactor coolant at the prescribed frequency for the parameters required to be monitored by the TSs. The procedure also included provisions for monitoring primary and secondary water quality based on established industry guidelines and standards. Although the licensee's procedure did not specifically indicate that their program included implementation of the Electric Power Research Institute (EPRI) guidelines for Pressurized Water Reactor (PWR) primary and secondary water chemistry, the inspectors used those guidelines as references for evaluating the effectiveness of the licensee's program. The inspectors noted that VPAP-2201 listed the sampling frequency and typical values for each parameter to be monitored. Action levels applicable to various operational modes were given where appropriate. Guidance was also provided for actions to be taken if analytical results exceeded prescribed limits. The inspectors determined that the above guidance and procedures were consistent with the applicable TS requirements and, with a few minor exceptions for good cause, the EPRI guidelines.

The inspectors also reviewed records of analytical results for selected parameters generated during the period September through November 1997. The parameters selected included dissolved oxygen, chloride, fluoride, pH, and dose equivalent iodine-131 in reactor coolant; copper and hydrazine in feedwater; sodium in steam generator blowdown; and ethanolamine in condensate. Those parameters were maintained well within the relevant TS limits and within the EPRI guidelines for power operations. The inspectors noted that the dose equivalent iodine-131 in the Unit 1 reactor coolant was approximately an order of magnitude higher than that of Unit 2 due to a leaking fuel rod in Unit 1.

c. Conclusions

Based on the above reviews, the inspectors concluded that the licensee's water chemistry control program for monitoring primary and secondary water quality had been implemented in accordance with the Technical Specification requirements and industry guidelines for pressurized water reactor water chemistry.

R1.4 Post Accident Sampling

a. Inspection Scope (84750)

The inspectors reviewed implementation of the licensee's program for obtaining and analyzing samples of reactor coolant and containment

atmosphere under accident conditions. The review included examination of procedures and records for operation of the High Radiation Sampling System (HRSS), training of personnel on operation of the system, and calibration of the system's in-line analytical instrumentation. The procedures and records were evaluated for consistency with the programmatic requirements specified in TS 6.4.M and with the design bases for system capabilities as described in Section 9.6 of the Updated Final Safety Analysis Report (UFSAR).

b. Observations and Findings

The inspectors reviewed 13 procedures pertaining to operation, training, and calibration of the HRSS. The procedures included provisions for operating the system on a monthly basis, alternating between units, for the purposes of verifying the functionality of the equipment and to provide continuing on-the-job training of personnel in the use of the equipment. Acceptance criteria were specified for comparison of the analytical results from the HRSS to results from the routine sampling methods. The procedures also provided for weekly calibration of the in-line analytical instrumentation. The inspectors determined that the licensee's procedures were consistent with TS 6.4.M and UFSAR Section 9.6. The licensee's records for the monthly operational tests of the HRSS during the period May through October 1997 and the weekly calibrations of the HRSS in-line analytical instrumentation during the period September through October 1997 were reviewed by the inspectors. The records indicated that the tests and calibrations had been performed at the prescribed frequency and that the results were generally satisfactory. During October 1997, the licensee had experienced problems with the apparatus for in-line measurement of pH and boron concentration of reactor coolant samples. Work requests were promptly issued for repair of the equipment. The inspectors noted that the HRSS included equipment for collecting diluted and undiluted grab samples for analysis by onsite or offsite laboratories if necessary.

c. Conclusions

Based on the above reviews and observations, the inspectors concluded that the licensee had implemented and maintained a program for obtaining and analyzing samples of reactor coolant and containment atmosphere under accident conditions in accordance with Technical Specification requirements and Updated Final Safety Analysis Report commitments.

**S1 Conduct of Security and Safeguards Activities (71750)**

On numerous occasions during the inspection period, the inspectors performed walkdowns of the protected area perimeter to assess security and general barrier conditions. No deficiencies were noted and the inspectors concluded that security posts were properly manned and that the perimeter barrier's material condition was properly maintained.

## F8 Miscellaneous Fire Protection Issues (71750)

### F8.1 Fire Protection Predecisional Enforcement Conference

On December 4, 1997, an open predecisional enforcement conference was held to discuss the results of an NRC inspection conducted during the period of August 24 through October 4, 1997. The inspection results were documented in NRC Inspection Report Nos. 50-280, 281/97-09 which were sent to the licensee by letter dated October 30, 1997. Four apparent violations were identified in this report.

EEI 50-280, 281/97009-03, Failure to meet the requirements of Appendix R for vital bus isolation.

EEI 50-280, 281/97009-04: Failure to meet the requirements of Appendix R for circuit breaker coordination.

EEI 50-280, 281/97009-05: Failure to promptly correct licensee identified Appendix R fire protection discrepancies.

EEI 50-280, 281/97009-06: Failure to report Appendix R fire protection discrepancies which were outside the design basis of the plant.

Based on information developed during the inspection and information provided during the predecisional enforcement conference, the NRC determined that violations of NRC requirements had occurred. Apparent violations EEI 50-280, 281/97009-03, and EEI 50-280, 281/97009-05 were identified as Violations (VIOs) 50-280, 281/EA 97-474 01013 and 50-280, 281/EA 97-474 01023 which constituted a Severity Level III problem. Apparent violation EEI 50-280, 281/97009-06 was identified as a Severity Level IV violation, VIO 50-280, 281/EA 97-474 02014.

Apparent Violation EEI 50-280, 281/97009-04, has been re-characterized as a deviation from a commitment in UFSAR Section 9.10. This deviation is identified as DEV 50-280, 281/97009-09.

### V. Management Meetings

#### X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee management at the conclusion of the inspection on January 7, 1998. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

#### PARTIAL LIST OF PERSONS CONTACTED

M. Adams, Superintendent, Engineering  
R. Allen, Superintendent, Maintenance

R. Blount, Assistant Station Manager, Nuclear Safety & Licensing  
 D. Christian, Station Manager  
 E. Collins, Director, Nuclear Oversight  
 M. Crist, Superintendent, Operations  
 B. Shriver, Assistant Station Manager, Operations & Maintenance  
 T. Sowers, Superintendent, Training  
 B. Stanley, Supervisor, Licensing  
 W. Thornton, Superintendent, Radiological Protection

#### INSPECTION PROCEDURES USED

IP 37551: Onsite Engineering  
 IP 40500: Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems  
 IP 61726: Surveillance Observation  
 IP 62707: Maintenance Observation  
 IP 71707: Plant Operations  
 IP 71750: Plant Support Activities  
 IP 84750: Radioactive Waste Treatment, and Effluent and Environmental Monitoring  
 IP 86750: Solid Radioactive Waste Management and Transportation of Radioactive Materials  
 IP 90712: Inoffice Review of Written Reports of Nonroutine Events at Power Reactor Facilities  
 IP 92700: Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities

#### ITEMS OPENED AND CLOSED

##### Opened

50-280, 281/97012-01	VIO	Failure to have appropriate procedures/checklists to return the AAC diesel generator to service following maintenance activities (Section 01.2)
50-280, 281/97012-02	VIO	Failure to properly perform operator logs (Section 01.3).
50-281/97012-03	VIO	Failure to follow work instructions related to the Unit 2 TDAFWP governor replacement (Section M1.1).
50-280, 281/97012-04	NCV	Improper bypass breaker testing due to inadequate definition of "in service" (Section M8.1).
50-280, 281/EA 97-474 01013	VIO	Failure to meet the requirements of Appendix R for vital bus isolation (Section F8.1).

- 50-280, 281/EA 97-474 01023 VIO Failure to promptly correct licensee identified Appendix R fire protection discrepancies (Section F8.1).
- 50-280, 281/EA 97-474 02014 VIO Failure to report Appendix R fire protection discrepancies which were outside the design basis of the plant (Section F8.1).
- 50-280, 281/97009-09 DEV Failure to meet the commitments to Appendix R for circuit breaker coordination (Section F8.1).

Closed

- 50-280, 281/97010-00 LER Missed fire protection surveillance due to personnel error (Section 08.1).
- 50-280, 281/97012-04 NCV Improper bypass breaker testing due to inadequate definition of "in service" (Section M8.1).
- 50-280, 281/97011-00 LER Improper bypass breaker testing due to inadequate definition of "in service" (Section M8.1).
- 50-280, 281/97009-03 EEI Failure to meet the requirements of Appendix R for vital bus isolation (Section F8.1).
- 50-280, 281/97009-04 EEI Failure to meet the requirements of Appendix R for circuit breaker coordination (Section F8.1).
- 50-280, 281/97009-05 EEI Failure to promptly correct licensee identified Appendix R fire protection discrepancies (Section F8.1).
- 50-280, 281/97009-06 EEI Failure to report Appendix R fire protection discrepancies which were outside the design basis of the plant (Section F8.1).