



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

Report Nos.: 50-280/86-29 and 50-281/86-29

Licensee: Virginia Electric and Power Company  
 Richmond, Virginia 23261

Docket Nos.: 50-280 and 50-281

License Nos.: DPR-32 and DPR-37

Facility Name: Surry 1 and 2

Inspection Conducted: September 7 through October 4, 1986

Inspectors: A. J. Ignatonis 10/23/86  
 for W. E. Holland, Senior Resident Inspector Date Signed

Accompanying Inspector: G. A. Schnebli

Approved by: A. J. Ignatonis 10/23/86  
 A. J. Ignatonis, Section Chief Date Signed  
 Division of Reactor Projects

SUMMARY

Scope: This routine inspection was conducted in the areas of plant operations, plant maintenance, plant surveillance, licensee event report review, followup on inspector identified items, IE Bulletin followup, and inspection of dry storage spent nuclear fuel facility.

Results: No violations or deviations were identified in this inspection report.

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## REPORT DETAILS

### 1. PERSONS CONTACTED

#### Licensee Employees

- \*R. F. Saunders, Station Manager
- \*D. L. Benson, Assistant Station Manager
- \*H. L. Miller, Assistant Station Manager
- \*D. A. Christian, Superintendent of Operations
- \*E. S. Grecheck, Superintendent of Technical Services
- \*J. W. Patrick, Superintendent of Maintenance
- \*S. Sarver, Superintendent of Health Physics
- R. Johnson, Operations Supervisor
- N. Clark, Site Quality Assurance Manager
- E. Brennan, Supervisor, Mechanical Maintenance
- \*W. D. Craft, Licensing Coordinator
- \*H. S. McKay, Senior Staff Engineer
- \*W. D. Grady, Supervisor, Quality Assurance
- \*J. Logan, Supervisor, Safety and Licensing

Other licensee employees contacted included control room operators, shift technical advisors, shift supervisors and other plant personnel.

\*Attended Exit Interview.

### 2. Exit Interview

The inspection scope and findings were summarized on October 7, 1986, with those individuals identified by an asterisk in paragraph 1. The licensee acknowledged the inspection findings with no dissenting comments. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during this inspection.

(Open) Inspector Followup Item (IFI) 50-280, 281/86-29-01, Relay Failures. This IFI was identified with regard to licensee determination of root cause(s) for reactor protection and safeguards relay failures and implementation of corrective action(s) for the cause(s).

(Closed) Inspector Followup Item (IFI) 280/84-24-03, Followup and review of licensee's Safety Engineering Staff failure analysis on Westinghouse type BF and BFD relays (paragraph 7).

### 3. Plant Operations

#### Operational Safety Verification (71707)

The inspector conducted daily inspections in the following areas: control room staffing, access, and operator behavior; operator adherence to approved procedures, Technical Specifications, and limiting conditions for operations; examination of panels containing instrumentation and other reactor protection system elements to determine that required channels are operable; and review of control room operator logs, operating orders, plant deviation reports, tagout logs, jumper logs, and tags on components to verify compliance with approved procedures.

The inspector conducted weekly inspections in the following areas:

Verification of operability of selected ESF systems by valve alignment, breaker positions, condition of equipment or component(s), and operability of instrumentation and support systems essential to system actuation or performance.

Plant tours which included observation of general plant/equipment conditions, fire protection and preventative measures, control of activities in progress, radiation protection controls, physical security controls, plant housekeeping conditions/cleanliness, and missile hazards.

The inspector conducted biweekly inspections in the following areas: verification review and walkdown of safety-related tagout(s) in effect; review of sampling program (e.g., primary and secondary coolant samples, boric acid tank samples, plant liquid and gaseous samples); observation of control room shift turnover; review of implementation of the plant problem identification system; verification of selected portions of containment isolation lineup(s); and verification that notices to workers are posted as required by 10 CFR 19.

Certain tours were conducted on backshifts. Inspections included areas in the Units 1 and 2 cable vaults, vital battery rooms, steam safeguards areas, emergency switchgear rooms, diesel generator rooms, control room, auxiliary building, cable penetration areas, low level intake structure, and safeguards valve pit areas. Reactor coolant system leak rates were reviewed to ensure that detected or suspected leakage from the system was recorded, investigated, and evaluated and that appropriate actions were taken, if required. On a regular basis, radiation work permits (RWPs) were reviewed and specific work activities were monitored to assure they were being conducted per the RWPs. Selected radiation protection instruments were periodically checked, and equipment operability and calibration frequency were verified.

In the course of monthly activities, the inspectors included a review of the licensee's physical security program. The performance of various shifts of the security force was observed in the conduct of daily activities to include: protected and vital areas access controls; searching of personnel, packages and vehicles; badge issuance and retrieval; escorting of visitors; and patrols and compensatory posts.

Unit 1 began the reporting period operating at power. The unit continued to operate at full power until September 18, 1986. On this date at 8:11 a.m. (EDT) the unit experienced a turbine runback to approximately 74 % power due to a dropped rod (P-6 in control bank A). The unit continued to operate at reduced power while troubleshooting was being performed to determine the reason for the dropped rod. After troubleshooting indicated that the problem was at the Control Rod Drive Mechanism (CRDM) in containment, power was reduced to approximately 20% in order to allow for troubleshooting/repair work to be conducted in containment. On September 19, a repair team entered containment to troubleshoot/repair the CRDM problem. The team exited containment at approximately 6:35 p.m. (EDT) to obtain additional tools. At approximately 8:58 p.m. (EDT) the unit was tripped by the operator in accordance with procedure due to indication that a second rod (P-10) had dropped. Apparently the second dropped rod was due to personnel entering containment, bumping the rod electrical junction box, and thereby causing an electrical malfunction. All systems performed as designed and the unit was taken to cold shutdown (less than 200 degrees F) on September 20, 1986. Repairs were made to both rod assemblies and the unit was restarted (critical) on September 24, 1986 at 6:58 a.m. (EDT). However, due to calibration problems with the steam generator level transmitters, repairs to steam generator B steam isolation bypass valve (MS 116), and repair of the turbine driven auxiliary feedwater pump governor valve, the unit was not connected to the grid until September 27, 1986. The unit operated at power for the rest of the reporting period.

Unit 2 began the reporting period operating at power. The unit continued to operate at power throughout the reporting period until October 3, 1986. At that time the unit began a rampdown in order to commence a scheduled refueling outage. On October 4, 1986, the generator was taken off line, the unit was shutdown, and the reactor coolant system was in the process of cooling down when the inspection period ended.

#### Onsite Followup of Events (93702)

On the morning of September 16, 1986, during performance of periodic test 1-PT-8.1 (Reactor Protection Logic - Normal Operating Conditions) safeguards relay AFP-2XB failed causing an auto start of AFW pump 1-FW-P-3B and closure of the steam generator blowdown valves. The relay was replaced and the PT completed that afternoon. The unit remained at power during the event. NRC notification of an ESF actuation was made in accordance with 10 CFR 50.72. On the morning of September 20, 1986, the Unit 1 operator observed that AFW

pump 1-FW-P-3B auto started and that the steam generator blowdown valves closed. The operator took appropriate immediate corrective actions and electrical troubleshooting determined that safeguards relay AFP-2XB had failed for the second time. The relay coil was replaced and the relay was tested on September 21, 1986. The unit was shutdown at the time of the failure and repair. NRC notification of an ESF actuation was made in accordance with 10 CFR 50.72. Due to the failure of the same safeguards relay in a four day time frame, the inspector conducted a maintenance inspection of repair of this type of relay. This inspection is discussed in paragraph 5.

During the evening of September 30, 1986, the plant conducted its annual emergency preparedness drill. The resident inspector monitored the drill during evaluation of initiating events in the control room through termination of the drill from an operational point of view in the technical support center. The NRC exit for this exercise was held on October 1, 1986. No significant findings were identified at the exit.

#### Engineered Safety Feature System Walkdown (71710)

The inspector performed a walkdown of the accessible portions of the service water system to verify its operability. This verification included the following: confirmation that the licensee's system lineup procedure matches plant drawings and actual plant configuration; hangers and supports are operable; housekeeping is adequate; valves and/or breakers in the system are installed correctly and appear to be operable; fire protection/prevention is adequate; major system components are properly labeled and appear to be operable; instrumentation is properly installed, calibrated and functioning; and valves and/or breakers are in correct position as required by plant procedure and unit status.

Within the areas inspected, no violations or deviations were identified.

#### 4. Maintenance Inspections (62703)

During the reporting period, the inspectors reviewed maintenance activities to assure compliance with the appropriate procedures. Inspections areas included the following:

##### Unit 1 Reactor Safeguards Relay Failures

The inspector reviewed the emergency work order associated with the repair of relay AFP-2XB. This is the relay which failed on September 20, 1986, and caused an engineered safety features actuation (Motor driven AFW pump 1-FW-P-3B auto started and steam generator blowdown isolation valves closed). The work order (Job No. 3800041142) resulted in replacement of the relay coil which had burned up. The coil replacement was done in accordance with procedure number EMP-C-RT-24. This is the standard procedure used for repair and replacement of Westinghouse type BF relays in the reactor

protection and safeguards racks. The inspector reviewed the completed procedure and determined that all work was accomplished in a satisfactory manner; however, due to the fact that this relay had failed for the second time in four days, the inspector held discussions with licensee management on evaluation of root causes for this type of failure.

The licensee provided the inspector with a draft copy of their Safety Engineering Staff's (SES) report titled "Analysis of Westinghouse BFD Relay Failures at Surry Power Station". The report was in response to NRC inspector followup item 280/84-24-03. The report discussed two other studies performed by Westinghouse and Siemens-Allis. The report then presented the SES evaluation along with conclusions and recommended corrective actions. The conclusion reached by the study was that increased relay coil temperature and dust or debris can lead to a shortened coil life. Also, most relay failures occurred on the lower tiers of the cabinets. Recommended corrective actions included: 1) a preventative maintenance program to clean the relays and cabinets per vendor recommendations, 2) improve air flow and air conditioning in relay rooms, 3) maintain a cleaner environment in relay rooms during maintenance activities, and 4) replace high failure relays that have been in use longer than two years.

After reviewing the report, the inspector held additional discussions with licensee management and was informed that additional evaluations were underway to help determine the root cause(s) of the high reactor protection and safeguards relay failure rate so that appropriate corrective action can be initiated. The inspector was informed that in the interim, corrective actions outlined in the draft SES report would be implemented. However, followup on licensee evaluation of root cause(s) for reactor protection and safeguards relay failures and implementation of corrective actions is identified as an inspector followup item (280; 281/86-29-01) for both units.

#### Unit 1 Steam generator level channel repair

On September 23, 1986, during restart of Unit 1 from a forced maintenance outage, C steam generator narrow range level channel (L-1-494) indicated a deviation of 6 % from the other two channels. An emergency work order was processed (Job Order 3800041279) to troubleshoot and repair the channel. The repair consisted of replacement of the transmitter. The inspector reviewed the completed work package and determined that the transmitter had been replaced using a properly approved procedure (IMP-C-MI-50, "Transmitter Replacement"). The procedure correctly documented all steps necessary to perform the maintenance and appropriate retest was conducted after repair was complete.

#### General Maintenance Work Order Review

The inspector reviewed the documentation associated with the following Maintenance Work Orders (MWOs) to ensure the licensee's maintenance programs are being implemented in accordance with regulatory requirements:

MWO 282078 - Replace Unit 2 Charging Pump Lube Oil Cooler Service Water Pump SW-P-10A and B.

MWO 284095 - Repack Unit 2 Service Water Strainers.

MWO 284801 - Rebuild 1-CC-P-2A Discharge Check Valve.

The documentation was reviewed to ensure: the cause of the failure was evaluated, if required, and adequate corrective action was taken to prevent recurrence; the procedures specified in the maintenance packages were adequate for the scope of the maintenance performed; required administrative approvals were obtained before initiating the work; approved procedures were used where the activity appeared to exceed the normal skills possessed by qualified maintenance personnel; inspections were made in accordance with the licensee's requirements and quality control records were complete; functional testing was completed prior to returning the equipment to service, as required; corrective and preventive maintenance records were assembled and stored as part of the maintenance history; the provisions for housekeeping and cleanliness were adequate; and the provisions for obtaining approval from operations when affected systems and ready to be restored to normal service were present.

Within the areas inspected, no violations or deviations were identified.

5. Surveillance Inspections (61726)

During the reporting period, the inspectors reviewed various surveillance activities to assure compliance with the appropriate procedures. Inspection areas included the following:

- On September 23, 1986, the inspector witnessed performance of periodic test 2-PT-15.1C (Steam Generator Auxiliary Feedwater Pump (2-FW-P-2)). The inspector reviewed the procedure and verified that the test was accomplished in accordance with the procedure.
- On September 24, 1986, the inspector witnessed performance of portions of periodic test 1-PT-2.5A (Steam Generator Level (L-1-494)).
- On September 26, 1986, the inspector reviewed periodic test 1-PT-2.5A (Steam Generator Level (L-1-494)). This test had been conducted after corrective maintenance was performed on the instrument. No discrepancies were identified.

Within the areas inspected, no violations or deviations were identified.

6. Licensee Event Report (LER) Review (92700)

The inspector reviewed the LER listed below to ascertain whether NRC reporting requirements were being met and to determine appropriateness of the corrective action(s). The inspector's review also included followup on

implementation of corrective action and licensee documentation that all required corrective action(s) were complete.

(Closed) LER 280/86-16, "B" Main Steam Safety Valve Setpoints

On May 10, 1986, with Unit 1 shutdown and reactor coolant temperature and pressure steady at 500 degrees F/2235 psig, as found testing of the Main Steam Code Safety Valves revealed that the lift settings for the five safety valves on "B" Main Steam Line (SV-MS-101B, 102B, 103B, 104B, 105B) (EIIS No. SBRV) were greater than three percent above their required setpoints. This condition is outside of the as found acceptance bank of +/-3 percent from setpoint. The testing was conducted using the Hydroset Testing Device in accordance with the vendor technical manual as implemented by the licensee's Periodic Test Procedure PT 13.1, 13.2 and 13.3.

A detailed engineering evaluation was performed by the licensee using the worst case as found setting (82 psi above required setpoint). This study concluded that, for the limiting overpressure event (complete loss of load without reactor trip), peak RCS temperature and pressure would not be significantly impacted, and the peak secondary side pressures would be well within the design capability of the secondary side. Therefore, an unreviewed safety question was not created and the health and safety of the public were not affected. These valves were previously set during the Unit 1 startup operations on December 23, 1984. At that time, all five of the "B" S/G safety valves failed due to low lift setpoint, and were adjusted to within one percent of their setpoints. However, the indicated steam pressure on the test gauge in the "B" Main Steam Line was significantly lower (approximately 50 psi) than the steam pressure in "A" and "C" lines. Since the RCS temperature and pressure were held steady for this test, and conditions in "B" S/G were similar to "A" and "C", the actual steam pressure in the "B" Main Steam Line was probably 50 psi higher than indicated. Therefore, the lower indicated pressure for "B" S/G was attributed to the pressure gauge. Since this lower pressure was used to set the safety valves, the actual lift setpoint would be higher than the required setpoint.

The five safety valves were adjusted to within one percent of their required setpoints and the licensee stated the safety valve test procedure will be revised to include a step that verifies indicated steam pressure with Control Room Steam Generator Pressure indication to prevent reoccurrence of this problem.

The inspector reviewed all the data associated with the setpoint testing conducted in May, 1986, and the previous testing in December of 1984. Based on the data reviewed, the inspector considers the licensee's conclusions, concerning gauge error in the December 1984 test, to be valid. This item is closed.

## 7. Followup on Inspector Identified Items (92701)

(Closed) IFI 280/84-24-03, Followup and review of licensee's Safety Engineering Staff failure analysis on Westinghouse type BF and BFD relays. The analysis was completed in November, 1985, and the report was submitted to management for review. The inspector was given a copy of the report during his maintenance inspection of recent safeguards relay failures. This inspection is discussed in detail in paragraph 4. This item is closed.

## 8. IE Bulletin Followup

(Open) 280; 281/85-BU-03, IE Bulletin 85-03. Motor-Operated Valve Common Mode Failures During Plant Transients Due to Improper Switch Settings. The inspector held discussions with responsible licensee engineers and management from the site and corporate concerning their program to satisfy the requirements of IEB 85-03. The licensee stated they are presently using the Motor Operated Valve Analysis and Test System (MOVATS) to provide demonstrated operability of the valves identified by the bulletin. The testing includes both static and dynamic tests to verify that the switch setpoint criteria established will ensure that these valves will perform their design function when exposed to maximum differential pressure (d/p) conditions. Initial testing includes evaluation of static signature for valve degradation, incorrect adjustments, and other abnormalities in the motor operated valve.

The inspector reviewed the licensee's corrective maintenance procedure EMP-C-MOV-151, CMP for Testing of MOV's using the MOVATS 2000 System. This procedure provides for obtaining and analyzing proper MOV setup and operation in the following areas: balancing of the torque switch in both the open and close direction; calibration of the spring pack deflection to valve stem load; dynamic thrust load signature; determination of control switch actuation and setpoints which encompasses the open and close limits, bypass limits and torque switches; dynamic motor current signatures; valve stroke time in both the open and close directions; and determination of MOV output thrust for various torque switch settings.

During the period of this inspection, the licensee was not performing any actions required by the bulletin; therefore, the inspector was unable to observe any actions in progress. The licensee was informed their program would be observed in future inspections to satisfy the requirements of the bulletin.

Within the areas inspected, no violations or deviations were identified.

## 10. Inspection of Dry Storage Spent Nuclear Fuel Facility (TI 0110/2)

Virginia Power received a license from the NRC issued on July 2, 1986, to package and store spent fuel assemblies at the Surry Independent Spent Fuel Storage Location (ISFSI) located on the Surry Power Station site. The license contained specific preoperational license conditions which had to be

satisfied prior to the loading of spent nuclear fuel. These conditions were:

- A training exercise (Dry Run) of all cask (storage container for spent fuel) loading and handling activities.
- Review and modification of the Surry Power Station Emergency Plan as required to include the ISFSI.
- Development of a training module establishing an ISFSI Training and Certification Program.
- Review and modification of the Surry Power Station Health Physics Procedures as required to include the ISFSI.
- Review and modification of the Surry Power Station Administrative Procedures as required to include the ISFSI.
- Development of a procedure for documentation of the characterizations performed to select spent fuel to be stored in the casks.
- Preparation of written abnormal/emergency procedures.

The inspector reviewed all the preoperational license conditions and then conducted an inspection of the following:

- The inspector witnessed selected portions of the training exercise (Dry Run) on September 29, 30, and October 1, 1986. They included cask handling operations, cask sealing and cover gas backfilling operations, cask movement to storage pad, and radiological control operations. The inspector also reviewed all procedures associated with the dry run after they were completed and verified that procedures were properly revised (deviated) as necessary during the dry run prior to performance of the revised steps.
- The inspector reviewed the training module establishing an ISFSI Training and Certification Program and verified that the program provides a comprehensive review of all ISFSI related activities. The licensee also furnished the inspector with a list of current personnel trained in accordance with the program.
- The inspector reviewed the applicable Emergency Plan Implementing Procedures and verified that these procedures had been changed to include ISFSI related events.
- The inspector reviewed the applicable Health Physics procedures and verified that these procedures had been prepared to insure that Technical Specification requirements were met for ISFSI related activities.

- The inspector reviewed the procedure for documentation of the characterizations performed to select spent fuel to be stored in the casks and verified that the procedure implements Technical Specification requirements. The procedure also provides for identification of assemblies stored in each cask. The inspector obtained cask loading maps for the first three casks (No. 500-11-003, 500-11-004, and 500-11-005) and verified that all assemblies to be loaded met Technical Specification requirements.

The inspection period ended prior to the inspector completing his review of the ISFSI preoperational license conditions. The inspector will complete this review during the next inspection period and document this inspection in next month's report. The outstanding items are:

- Completion of training exercise (Dry Run) including certification of all personnel who conducted the dry run.
- Review and modification of Administrative Procedures.
- Review of written abnormal/emergency procedures.

The inspector will also document an ongoing review of documentation and certification records that the casks meet vendor and the licensee's quality assurance requirements.

Within the areas inspected, no violations or deviations were identified.