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

Report Nos.: 50-280/92-20 and 50-281/92-20

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

Docket Nos.: 50-280 and 50-281

License Nos.: DPR-32 and DPR-37

Facility Name: Surry 1 and 2

Inspection Conducted: September 5 through October 3, 1992

Inspectors:

A Ruff For 10/30/92
M. W. Branch, Senior Resident Inspector — Date Signed

A Ruff For 10/30/92
J. W. York, Resident Inspector — Date Signed

A Ruff For 10/30/92
S. G. Tingen, Resident Inspector — Date Signed

Accompanying Inspector: A. B. Ruff

Approved by: 11/2/92
P. E. Fredrickson, Section Chief — Date Signed
Division of Reactor Projects

SUMMARY

Scope:

This routine resident inspection was conducted on site in the area of operations, maintenance, surveillance, quality verification, licensee event review, and action on previous inspection items. During the performance of this inspection, the resident inspectors conducted review of the licensee's backshifts or weekend operations on September 6, 7, 16, 26, 27 and October 1, and 3.

Results:

In the operations area, the following items were noted:

The noise level in the control room has been reduced through a modification to the Gaitronic system and the control room is much quieter (paragraph 3.a).

Management's sensitivity to recent operator errors was noted. A recent increasing performance trend of operator errors indicates a low problem identification threshold and appears to warrant the current level of management attention in order to turn around this trend (paragraph 3.b).

In the maintenance/surveillance functional area, the following item was noted:

Communications between operations and I&C was considered good while troubleshooting the Unit 1 rod control urgent failure alarm (paragraph 4.a).

In the safety assessment/quality verification area, the following items were noted:

The post-trip review process clearly has a positive effect on the safe return of the plant to power operation (paragraph 6).

The licensee identification of a steam flow scaling error during special testing resulted in the correction of a safety issue associated with steam flow trip setpoints that had gone unnoticed since a 1977 modification. The safety significance of the issue was somewhat mitigated since the actual setpoints, although not in accordance with TS limits, were bound by the accident analysis. The failure to satisfy the TS limits for the steam flow setpoints was identified as a non-cited violation (paragraph 7.a).

REPORT DETAILS

1. Persons Contacted

Licensee Employees

* R. Allen, Supervisor, Operations
* W. Benthall, Supervisor, Licensing
R. Bilyeu, Licensing Engineer
H. Blake, Superintendent of Site Services
* B. Bryant, Licensing
R. Blount, Superintendent of Engineering
* H. Collar , Supervisor, Quality Assurance
* D. Christian, Assistant Station Manager
* J. Downs, Superintendent of Outage and Planning
D. Erickson, Superintendent of Radiation Protection
* R. Gwaltney, Superintendent of Maintenance
* M. Kansler, Station Manager
A. Meekins, Supervisor, Administrative Services
J. McCarthy, Superintendent of Operations
* R. MacManus, Supervisor, System Engineering
* A. Price, Assistant Station Manager
* R. Saunders, Assistant Vice President, Nuclear Operations
E. Smith, Site Quality Assurance Manager
* B. Stanley, Supervisor, Station Procedures
J. Swientoniewski, Supervisor, Station Nuclear Safety
G. Thompson, Supervisor, Maintenance Engineering
A. Wheeler, Shift Supervisor, Nuclear

NRC Personnel

* M. Branch, Senior Resident Inspector
* S. Tingen, Resident Inspector

* Attended Exit Interview

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

On September 11, the inspectors accompanied Dr. Thomas Murley, Director of NRR, on a tour of the Surry facility. The major emphasis of the tour was a familiarization of plant equipment vulnerability to internal flooding that was identified during the NRC IPE review.

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

2. Plant Status

Unit 1 began the reporting period with the reactor at approximately 5% power with the main turbine off-line to repair a leaking transformer bushing on the C station service transformer. The main generator was reconnected to the grid on September 6, and the unit was at power at the end of the inspection period, day 27 of continuous operation.

Unit 2 began the reporting period in power operation. The unit was at power at the end of the inspection period, day 77 of continuous operation.

Both units periodically ramped power to allow cleaning of condenser water boxes. The water boxes were being clogged by hydroids and other marine life.

3. Operational Safety Verification (71707, 42700)

The inspectors conducted frequent tours of the control room to verify proper staffing, operator attentiveness and adherence to approved procedures. The inspectors attended plant status meetings and reviewed operator logs on a daily basis to verify operations safety and compliance with TSs and to maintain awareness of the overall operation of the facility. Instrumentation and ECCS lineups were periodically reviewed from control room indication to assess operability. Frequent plant tours were conducted to observe equipment status, fire protection programs, radiological work practices, plant security programs and housekeeping. Deviation reports were reviewed to assure that potential safety concerns were properly addressed and reported.

a. Control Room Environment Improvement

The gaitronics is utilized for communications throughout the plant. During the inspection period, the licensee modified the operation of the gaitronics communication system in order to decrease the overall noise level in the control room. Prior to the modification, paging personnel over the gaitronics would be broadcasted throughout the plant including the control room. This created a lot of unnecessary background noise in the control room. The licensee modified the gaitronics so that paging of only control room personnel would be heard in the control room. This resulted in a significantly decreased noise level in the control room.

b. Operational Errors

On October 2, the inspectors met with the Surry Operations Superintendent to discuss what appeared to be an increasing trend in the number of operational errors. Errors occurring during the period September 14 through September 29 which resulted in deviation reports were evaluated by the inspectors. The inspectors discussed the following four station deviations with the Superintendent:

-DR No. S-92-1514 - The 1A CC heat exchanger was returned to service with its CC side outlet valve (valve no. 1-CC-583) still closed. Procedure 0-MOP-51.17 step 5.1.3 was signed off for valve 1-CC-583 being open. Another operator noticed the error. Operations management discussed the error with the operator and discussed the necessity to think about the procedural instructions.

-DR No. S-92-1578 - The remote alarm cutout switch was found in the silenced position which would prevent the control room from receiving indications of an alarm condition on TS heat trace circuits. The probable cause was human error by operations or maintenance. A check showed that maintenance had been performed two weeks previously but did not identify the responsible department. To correct this potential problem, a check for the position of this switch has been added to the operators' check list.

-DR No. S-92-1610 - The Unit 2 outside RS train was tagged out for repair of the service water pump 1-SW-P-5B return line. The operator closed MOV-SW-205C instead of MOV-SW-205B for isolation purposes. The on-shift RO researched the prints, but the SRO did not independently review the decision as required by the OPS guidelines. The error was identified through the second check process prior to release of work.

-DR No. S-92-1617 - The Unit 1 SRO and the shift supervisor erroneously decided that opening a particular valve (1-CH-98) would bypass the boric acid filter. The shift supervisor decided it was not necessary to use the maintenance procedure, 1-MOP-8.27, Removal of Boric Acid Filter from Service, to remove the filter from service. This alignment resulted in the flow from the B to the A BAST and later in the shift a high level alarm in the A BAST was received. The error was realized and the correct valve line-up was performed using the MOP.

While none of the events caused a serious safety concern, the number of errors over the two week period seemed to indicate an increasing trend in operational errors. The concern was discussed with the Operations Superintendent who indicated that operations management had also noted the trend. The inspectors confirmed that meetings had been held with the shift supervisors and that operations management was in the process of briefing all of the shift personnel concerning these events and the trend.

Management's sensitivity to recent operator errors was noted by the inspectors. Recent performance trends denoting an increase in operator errors indicate a low problem identification threshold and appears to warrant the current level of management attention in order to turnaround this trend. The inspectors will continue to follow the licensee's activities in this area.

c. Evaluation of Opening in Charging Pump Cubicle Walls

While touring the auxiliary building, the inspectors noted that the concrete walls that enclosed the charging pumps contained unsealed penetrations. Several holes approximately six inches in diameter and other openings existed around piping or ventilation ducting that passed through the walls. The inspectors reviewed Chapter 10, Section 8, of the licensee's 10 CFR 50 Appendix R Report and concluded that the charging pump cubicle concrete walls were classified as non-rated fire barriers. The issue of openings in non-rated fire barriers was discussed in detail with the licensee. The inspection concluded that these openings were acceptable, since the charging pump cubicle concrete walls were not classified as fire rated boundaries, and an alternative means of safe plant shutdown was available in the event of a fire in this area.

Within the areas inspected, no violations were identified

4. Maintenance Inspections (62703) (42700)

During the reporting period, the inspectors reviewed maintenance activities to assure compliance with the appropriate procedures.

On October 2, a Unit 1 control rod urgent failure alarm occurred while the inspectors were in the control room. Upon receipt of the alarm operators placed the rod control system in manual and entered a TS LCO to restore the control rods to an operable status within the next two hours or be in Hot Shutdown within the next 6 hours.

The inspectors witnessed troubleshooting activities associated with urgent failure alarm. The troubleshooting was accomplished by I&C technicians in accordance with IMP-C-EPCR-46, Maintenance of Rod Control System, dated June 26, 1989, and WO 3800133273. Troubleshooting identified faults in the moveable-phase-control card and moveable-firing-circuit card. These cards were replaced and the urgent failure alarm cleared. The control rods were satisfactorily tested and the LCO was exited. Testing of the control rods is further discussed in paragraph 6.b. The inspectors attended the prejob brief and reviewed the completed work package and post-maintenance test requirements. The inspectors noted that communications between operations and I&C was good. Also, the inspectors noted that there were operator aids in the form of uncontrolled vendor drawings taped to the interior of the rod control power cabinet doors. The drawings were not used during these troublshooting activities. A recent QA audit, 92-11, identified the use of operator aids as inappropriate, and as a result, corrective actions are scheduled to be implemented to remove and restrict the use of operator aids.

Within the areas inspected, no violations were identified.

5. Surveillance Inspections (61726, 42700)

During the reporting period, the inspectors reviewed surveillance activities to assure compliance with the appropriate procedure and TS requirements.

The following surveillance activities were reviewed:

a. Calibrations of Pressure Indicators

On September 27, the inspectors observed the partial calibration of pressure indicator 2-CH-PI-1104 which is the discharge pressure indicator for boric acid transfer pump 1-CH-P-2D. The I&C technicians were using procedure 2-IMP-CH-PI-001, Charging System ASME Section XI Pressure Indicator Calibrations, dated July 18, 1991. The technicians took the as-found readings on this pressure indicator. These readings were within the acceptable range for the instrument, but at the high end. The indicator was later adjusted to the mid-range and another set of satisfactory as-left readings were taken. The inspectors later reviewed the calibration documentation. No discrepancies were identified.

b. Unit 1 Rod Control System Testing

On October 2, the inspectors witnessed testing of the rod control system in accordance with 1-PT-6.0, Control Rod Partial Movement, dated July 23, 1992. This testing was performed as a result of maintenance on the rod control system that effected shutdown bank B, and control rod banks B and D. In order to prove operability, the affected control rods were moved 18 steps in and then back out 18 steps. The inspectors witnessed the testing from the control room. No discrepancies were identified.

Within the areas inspected, no violations were identified.

6. Review of Unit 1 Reactor Trip Report (40500)

VPAP-1404, Reactor Control, Revision 0, requires that a formal report be prepared for each reactor trip. The purpose of the report is to confirm the preliminary findings, and summarize or identify corrective actions associated with the reactor trip. The report is required by VPAP-1404 to be approved by SNSOC within thirty days following a reactor trip. The inspectors reviewed the trip report, dated June 16, 1992, for the Unit 1 automatic reactor trip that occurred on May 7, 1992. This Unit 1 automatic reactor trip was previously discussed in NRC IR 280,281/92-11. The inspectors noted that although the report was not approved by SNSOC within thirty days, it was thorough and accurate.

Several items associated with the reactor trip were identified as needing further review in the trip report. These items involved the turbine driven AFW pump response time and emergency procedure guidance for ensuring adequate TS shutdown margin. The inspectors reviewed the licensee's actions to resolve these issues and concluded that the issues were satisfactorily resolved or that the licensee was satisfactorily pursuing this issues. The licensee's post-trip review process clearly has a positive effect on the safe operation of the plant, in that transient response characteristics were verified and the thoroughness of the process was considered a strength.

Within the area inspected, no violations were identified.

7. Licensee Event Review (92700)

The inspectors reviewed the LERs listed below and evaluated the adequacy of corrective action. The inspector's review also included followup on the licensee's implementation of corrective action.

a. (Closed) URI 280,281/91-21-02 and LER 280,281/91-014, Steam Flow Transmitter Scaling Errors. This issue involved the licensee's discovery that TS limits associated with steam flow protection setpoints were violated due to personnel errors associated with a 1977 modification that rescaled the steam flow instruments. The initial discovery of this issue is documented in detail in NRC IR 50-280,281/91-21. In that report the inspectors documented that the licensee investigated the effect of the incorrectly scaled steam flow transmitters on the overall accuracy of the steam flow instrumentation and on reactor protection and ESF setpoints.

Midway through the investigation for Unit 2, the licensee concluded that the Unit 1 MS flow transmitters were also incorrectly scaled. The licensee determined that the incorrectly scaled transmitters affected the MS flow reactor protection and ESF setpoints in a nonconservative direction. The magnitude of this error was unknown, but the current settings were within the limits of the safety analysis.

On July 22, 1991, the bias on each of the Unit 2 ESF MS flow channels was adjusted to compensate for the nonconservative error introduced by the improperly scaled transmitters. On July 24, 1991, the bias on the Unit 1 ESF MS flow channels was adjusted for the same reason. The magnitude of the ESF MS flow channel bias adjustments was based on engineering judgment to ensure that the settings were within the TS limits. On July 24, 1991, as a result of an investigation, the licensee concluded that prior to the July 22, 1991, setting adjustments, the Unit 2 ESF high steam flow setpoints exceeded the limits specified in TS, but were within the design safety analysis.

The special flow measurements (ST-302) in 1991 that provided the basis for the Unit 2 bias was not conducted for Unit 1. At the end of that inspection period documented in NRC IR 50-280, 281/91-21, the licensee was investigating the magnitude of the error introduced by the incorrectly scaled steam flow transmitters on the Unit 1 ESF setpoints. Since ST-302 was not performed on Unit 1, in the interim, on July 26, 1991, the bias on each of the Unit 1 ESF MS flow channels was adjusted based on the worst case Unit 2 setpoints error. The licensee also concluded that the effect of the scaling error on the MS flow transmitters did not adversely affect the low SG water level with a steam/feedwater flow mismatch reactor trip circuitry.

To develop steam flow instrument setpoint scaling valves for Unit 1, the licensee conducted special testing during the 1992 scheduled refueling outage. The inspectors reviewed the licensee test results conducted on February 3, 27, 28 and 29, 1992. The testing was performed using the Combustion Engineering's CHEMTRAC feedwater flow tracer process. The results of the test were reviewed by engineering, and calculations were performed to translate the test results into instrument scaling and setpoint changes. The inspectors reviewed calculation EE-0419 which assigned correction factors that were applied to the indicated feed flow values. The instrument accuracy was corrected by the performance of the feed flow calibration PT which was revised prior to accomplishment based on the new values provided by engineering. The inspectors consider the licensee actions acceptable and this item is closed.

Since the LERs discussed above identified that the original setpoints were nonconservative in respect to the TS required values the licensee was in violation of TS 3.7.D. The licensee identification of the steam flow scaling error during special testing resulted in the correction of a safety issue associated with steam flow trip setpoints that had gone unnoticed since a 1977 modification. The safety significance of the issue was somewhat mitigated since the actual setpoints, although not in accordance with TS limits, were bounded by the accident analysis. This licensee identified violation (NCV 50-280,281/92-20-01) is not being cited because criteria specified in Section VII.b of the NRC Enforcement Policy were satisfied.

b. (Closed) LER 280/91-012, Pressurizer Level Channel Not Placed in Trip Within Six Hours Due to Personnel Error. This issue involved the failure to place pressurizer level indicator 1-RC-LI-1461 in trip because its indicated value exceeded channel check acceptance criteria specified in the surveillance procedure. The TS allows six hours to place the channel in trip. The operations trainee did not recognize that the value exceeded the acceptance criteria and neither the reactor operator responsible for the surveillance nor the shift supervisor reviewed the PT. The reactor operator was counseled on his responsibility for the accuracy of recorded data and for the proper supervision of assigned trainees. Further corrective actions taken included providing the description of the event and lessons learned to the class of RO/SRO's that were being trained at the time of the event and developing enhanced instructions for future classes. All of the corrective actions have been implemented.

c. (Closed) LER 280/91-009, Technical Specifications Surveillance Requirements Violated for Inservice Inspection of Unit 1 Reactor Vessel Due to a Cognitive Personnel Error. This issue involved a missed ASME Section XI ISI inspection. Unit 1 was at 100 percent power on May 9, 1991, when the licensee discovered that a visual inspection of the reactor vessel partial penetration welds and the bottom of the reactor were not performed during the 1990 refueling outage. An administrative oversight, whereby the inspections were inappropriately removed and not returned to the ISI plan, was identified as the cause of the event. The intent of this test is to monitor the reactor vessel integrity. Daily leak rates were calculated for Unit 1 to ensure that TS allowed unidentified leakage was not exceeded. Containment air sampling was increased from weekly to daily to assist in leak detection. On January 8, 1992, during an unscheduled outage, the visual examination, VT-2, was performed on the bottom of the reactor vessel and the partial penetration welds. The inspectors examined the ISI program for Unit 1 and noted that the visual examination had been returned to the program.

d. (Closed) LER 280/92-001, Dropped Rod Due to Personnel Error Followed by a Required Manual Reactor Trip. This event occurred after control rod E-5 dropped into the core. (It was later determined that its coil stack failed.) As a result, trouble shooting was performed. The trouble shooting guide required the removal of fuses. One of the removed fuses was common to the movable coils of E-5 and H-2. When the control rods were manually stepped to control delta flux, H-2 dropped into the core because its stationary coil deenergized and its movable coil did not energize. The reactor was manually tripped in accordance with procedure. This event is discussed more fully in NRC IR 50-280,281/91-37. The dropping of the second rod was attributed to an inadequate trouble shooting guide procedure. The licensee's corrective action to prevent recurrence of this type of event included changes to procedures and training. An evaluation sampling was performed of the corrective actions by reviewing procedure changes and various training lesson plans. Corrective actions that are not complete, such as some craft training and development of a new electrical maintenance procedure for rod control trouble shooting, are being tracked by the licensee's CTS.

Procedures reviewed were AP-1.01, Control Rod Misalignment, and IMP-C-EPCR-46, Maintenance of Rod Control System. Steps and caution notes concerning ramification and actions required for stepping control rods with control rod trouble shooting in process were incorporated into these procedures.

Lesson plans reviewed were TSMT-92.1-LP-1, TSCT-92-LP-1, ECT-1-LP-8 and NITCTP-1-LP-14. These lesson plans covered the subjects of test controls, conduct of infrequently performed tasks and root cause determinations, and included the above event, its cause, and lessons learned.

Within the areas inspected, no violations were identified.

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

   a. (Closed) VIO 280/91-37-01, Failure to Follow the Requirements of 10 CFR 50.55a(g). This issue involved whether it was necessary for the licensee to request that the Commission grant relief for the repair or return to service of a Class 2 letdown line with a leaking weld. The licensee denied the violation and, after further NRC review, the subject violation was withdrawn. The licensee had concluded that it was not necessary to request NRC relief based upon the Surry TS and an ASME Code Inquiry. The NRC is continuing to review the adequacy of this interpretation.

   b. (Closed) P21 280,281/91-06, Overspeed Trip Tappets For Terry Steam Turbine Pump Drivers in AFW Systems. This issue involved Terry turbines equipped with a molded head type tappet. Under high temperature and humidity, parts of the tappet would swell preventing the tappet from reseating following a trip of the Terry turbine. The inspectors reviewed the design of the turbine driven AFW pumps overspeed trip tappets utilized at Surry and concluded that they were not the molded head type discussed in this notice. The Surry turbine driven AFW pumps utilize the ball type tappets.

9. Exit Interview

The results were summarized on October 7, with those individuals identified by an asterisk in Paragraph 1. The following summary of inspection activity was discussed by the inspectors during this exit:

Item Number	Status	Description
NCV 280,281/92-20-01	Closed	Failure to Satisfy TS Limits Associated with Steam Flow Setpoints (para 7.a).
VIO 280/91-37-01	Closed	Failure to Follow the Requirements of 10 CFR 50.55a(g) (para. 8.a).
P21 280,281/91-06	Closed	Overspeed Trip Tappets For Terry Steam Turbine Pump Drivers in AFW Systems (para 8.b).

URI 280,281/91-21-02	Closed	Steam Flow Transmitter Scaling Errors (para 7.a).
LER 280,281/91-014	Closed	Steam Flow Transmitter Scaling Errors (para 7.a).
LER 280/91-012	Closed	Pressurizer Level Channel not Placed in Trip Within Six Hours Due to Personnel Error (para 7.b)
LER 280/91-009	Closed	Technical Specifications Surveillance Requirements Violated for ISI of Unit 1 Reactor Vessel Due to Cognitive Personnel Error (para 7.c).
LER 280/92-001	Closed	Dropped Rod Due to Personnel Error Followed by a Required Manual Reactor Trip (para 7.d).

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

10. Index of Acronyms and Initialisms

AFW - AUXILIARY FEEDWATER
ASME - AMERICAN SOCIETY OF MECHANICAL ENGINEERS
BAST - BORIC ACID STORAGE TANK
CC - COMPONENT COOLING
CFR - CODE OF FEDERAL REGULATIONS
CTS - COMMITMENT TRACKING SYSTEM
DR - DEVIATION REPORT
ECCS - EMERGENCY CORE COOLING SYSTEM
ESF - ENGINEERED SAFETY FEATURES
GL - GENERIC LETTER
I&C - INSTRUMENTATION AND CONTROL
IPE - INDEPENDENT PLANT EVALUATION
IR - INSPECTION REPORT
LCO - LIMITING CONDITIONS OF OPERATION
LER - LICENSEE EVENT REPORT
MOP - MAINTENANCE OPERATING PROCEDURE
MS - MAIN STEAM
NCV - NONCITED VIOLATION
NRC - NUCLEAR REGULATORY COMMISSION
NRR - OFFICE OF NUCLEAR REACTOR REGULATION
OPS - OPERATIONS DEPARTMENT
PT - PERIODIC TEST
QA - QUALITY ASSURANCE
RO - REACTOR OPERATOR
RS - RECIRCULATION SPRAY
SNSOC - STATION NUCLEAR SAFETY AND OPERATING COMMITTEE
SOER - SIGNIFICANT OPERATING EVENT REPORT

SRO	-	SENIOR REACTOR OPERATOR
TS	-	TECHNICAL SPECIFICATIONS
URI	-	UNRESOLVED ITEM
VIO	-	VIOLATION
VPAP	-	VIRGINIA POWER ADMINISTRATIVE PROCEDURE
WO	-	WORK ORDER