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

Report Nos.: 50-280/93-03 and 50-281/93-03

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: January 3 through February 6, 1993.

Inspectors:

Albert B. Ruff For — 2/26/93
J. W. York, Acting Senior Resident Inspector — Date Signed

Albert B. Ruff For — 2/26/93
S. G. Tingen, Resident Inspector — Date Signed

Approved by: G. A. Belisle — 2/26/93
G. A. Belisle, Section Chief — Date Signed
Division of Reactor Projects

SUMMARY

Scope:

This routine resident inspection was conducted on site in the area of operational safety verification, maintenance inspections, surveillance inspections, plant status, safety assessment and quality verification, and action on previous inspection items. During the performance of this inspection, the resident inspectors conducted review of the licensee's backshifts, holiday or weekend operations on January 3, 8, 9, 21, 24, 28, and February 6, 1993.

Results:

In the operations area, the following items were noted:

Operators properly responded to the Unit 1 automatic safety injection and reactor trip that occurred on January 8 (paragraph 3.b).

The recovery from the Unit 1 trip was well planned, managed, and carried out by the licensee. Operators continue to respond to events in a superior manner (paragraph 3.d).

The fire watches were properly performing actions required by the Justification for Continued Operation for Appendix R deficiencies (paragraph 3.f).

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

The planning department implemented an innovative computer system to enhance safe operation during the upcoming Unit 2 RFO (paragraph 4.b).

In the engineering/technical support area, the following item was noted:

After replacing a defective relay and during the return of a high consequence limiting safeguards circuit to normal, a safety injection occurred due to a spurious signal. This spurious signal occurred because of a personnel (engineering) error. A non-cited violation was identified for this error (paragraph 3.c).

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

The Performance Annunciator Panel Program is an excellent tool for assessing station performance and the program has identified areas in material plant condition that need improvement. The corrective actions for these areas are long term. As a result, the day to day material condition problems will continue to exist until the long term corrective actions are fully implemented (paragraph 6.a).

The licensee's fitness for duty audit was effective in that a deficiency associated with testing of blind samples was identified and corrected (paragraph 6.b).

The Corporate Nuclear Safety Analysis Reports Closure Summaries were quality reports; however, they were not completed within the suggested 90 day Operation Event Review Program guidelines (paragraph 7).

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
M. Bowling, Manager, Corporate Nuclear Licensing
R. Blount, Superintendent of Engineering
* D. Christian, Assistant Station Manager
J. Downs, Superintendent of Outage and Planning
D. Erickson, Superintendent of Radiation Protection
* A. Fletcher, Assistant Superintendent, Engineering
R. Gwaltney, Superintendent of Maintenance
* M. Kansler, Station Manager
* C. Luffman, Superintendent, Security
A. Meekins, Supervisor, Administrative Services
* J. McCarthy, Superintendent of Operations
J. O'Hanlon, Vice President, Nuclear Operations
* 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

NRC Personnel

* S. Tingen, Resident Inspector
* J. York, Acting Senior Resident Inspector

Accompanying NRC Inspector

A. Ruff

*Attended Exit Interview

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

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

2. Plant Status

Unit 1 began the reporting period in power operation. On January 8, an automatic SI and reactor trip occurred due to a relay failure that

resulted in a Train A Hi CLS signal. This event is further discussed in paragraph 3.b. The unit was restarted and at power on January 11. The Unit was at power at the end of the inspection period, day 27 of continuous operations.

Unit 2 began the reporting period in power operation. The unit started to coastdown on February 2, at 12:00 p.m., and at the end of the inspection period the unit was at 96 percent power and at day 203 of continuous operation.

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 indications 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. Licensee 10 CFR 50.72 Reports

On January 8, the licensee made a 10 CFR 50.72 report concerning the Unit 1 automatic SI and reactor trip. An automatic SI Train A Hi CLS signal was initiated as a result of a failed relay. With the exception of source range nuclear instrumentation channel N-31 not indicating and the auctioneered Tave meter being stuck, all systems operated as required in response to the SI and reactor trip. This event is discussed in paragraph 3.b.

On January 9, the licensee made a 10 CFR 50.72 report concerning a spurious initiation of Train A SI in Unit 1. After replacing the relay that caused the Unit 1 reactor trip on January 8, 1993, an SI signal occurred because a temporary modification (electrical jumper) was not removed before starting the post modification testing. The event is discussed in paragraph 3.c.

b. Unit 1 SI and Reactor Trip

On January 8, the licensee performed 1-PT-8.4, Consequence Limiting Safeguards (Hi-Train). The purpose of this PT is to test Train A and B of the HI Safeguards Logic on a monthly basis. Following the successful performance of the test on Train A, technicians attempted to restore Train A by repositioning the cabinet test switch. However, train A could not be realigned to a normal configuration and remained in the test configuration with the output bypassed. A TS 12-hour Action Statement to hot

shutdown was entered and the licensee began troubleshooting. Initial troubleshooting required that the Train A test terminate button be depressed while circuit voltages were checked. After completing the troubleshooting, a Train A Hi CLS signal occurred causing a Unit 1 automatic SI and reactor trip. The signal was initiated as a result of a failed relay.

At the time of the reactor trip, the inspectors were monitoring the Train A CLS troubleshooting activities in the emergency switchgear room. The inspectors immediately went to the control room and monitored the licensee's response to the event.

Operators properly responded to the event. With the exception of auctioneered Tave meter TI-140A and N-31 source range nuclear instrument, all systems operated properly. The PORVs and safety relief valves did not lift. While recovering from the event, pressurizer level increased and indicated off scale high because of the SI flow into the RCS. Later in the event, operators concluded that the pressurizer did not become totally filled with water (go solid) because RCS pressure spikes were not observed. Level in the pressurizer was quickly restored after securing SI flow. The N-31 source range instrument did not indicate and the auctioneered Tave meter stuck at 551 degrees F. The meter indicated properly when tapped.

The cause of the invalid Train A Hi CLS SI signal was attributed to a degraded relay in the Train A Hi CLS actuation logic circuit. The relay contacts were dirty and a wiring fastener that secured three wires to the relay was loose. The relay was replaced, and the Train A Hi CLS circuit was tested satisfactorily. The licensee performed an RCE for the event. The inspectors reviewed both the RCE and the event, and determined that the licensee's conclusion regarding the degraded relay was correct.

The N-31 source range nuclear instrument did not indicate because the detector had failed. The detector was replaced and was tested satisfactorily. The Tave meter was also replaced.

c. SI Initiation Due to Personnel Error

The day after the reactor trip, a spurious initiation of Train A SI occurred during the post modification testing for the replacement relay. The inspectors entered the control room approximately three minutes after this SI and observed operators recovering from the event, including the SI termination. The operators responded properly to the event and the systems were operational and responded as designed.

Troubleshooting on the Train A Hi-CLS circuitry, after the reactor trip of February 8, identified that relay 3/4-CLS-1A was degraded. An electrical jumper, temporary modification, was placed across

contact 2 of SI actuation relay CR-CLS-1A1. This was done to maintain or lock in the Train A SI signal in order to prevent additional spurious SI signals from occurring during troubleshooting and subsequent relay replacement. After the relay was replaced and start of post modification testing, the test switch was returned to normal and at this time the Train A SI injection occurred.

The inspectors discussed the SI error with the engineer involved and also reviewed the RCE of this event. Prior to testing, the engineer used Westinghouse drawing No. 113E243, sheet 6, Surry 1 and 2 Safeguards System, to determine the affects that jumper would have on the test. This drawing was incomplete, in that, it did not show contact 2 of the test switch; However, station drawing 11448-ESK-7H did show both contacts (test switch and relay CR-CLS-1A1 contacts). Although both drawings were used for task preparation activities, the Westinghouse drawing was only reviewed for jumper affects during post modification testing. Either a second jumper should have been placed across contact 2 of the test switch or the jumper across contact 2 of relay CR-CLS-1A1 should have been removed before starting post modification testing. The Westinghouse drawing has been updated to show the test switch contact. This error by licensee engineering personnel is identified as NCV 50-280/93-03-01, Spurious SI Caused By Personnel (Engineering) Error. This violation will not be subject to enforcement action because the licensee's efforts in identifying and correcting the violation meet the criteria specified in Section VII.B of the Enforcement Policy.

d. After Trip Activities

The inspectors attended a licensee meeting on the morning of February 9 after the second SI. The meeting was held to determine tasks and corrective action measures that needed to be accomplished to restart the unit. Tasks were identified, prioritized, and assigned to a responsible organization. It was evident in the meeting that prior planning had already been underway before the meeting. Some of the tasks were: RCE for the trip and the second SI, surveillances needed before unit startup, repair of the seal on the 'A' main feedwater pump, troubleshooting the NI-31 source range detector, troubleshooting EDG 3 for it's failure to stop when it's push-button position switch was turned off, etc. All these tasks were well planned and carried out in an efficient manner. The working relationship between management at all levels and the personnel from the various groups was smooth and efficient. The communication between the licensee and the inspectors about various details of this effort was excellent.

e. Control Room Design Review

During a control room design review at Surry, 84 items were identified as requiring corrective action. Forty-three of the highest priority corrective actions have been completed. A reevaluation by the licensee showed that 23 items do not have to be performed. The remaining 18 items are scheduled to be completed by the end of both Units' refueling outages in 1994.

A senior operations engineer from the Human Factors Engineering Section, NRR, was at Surry on January 25-28 to review the 23 items that the licensee considered as not being necessary. The data collected will be used to respond (by SER) to the licensee's revised submittal for the control room design review. During the walkdown by this engineer, several items were noted that needed to be corrected. Three steam generator narrow range recorders are mounted on a mobile cart and are used as an operator aid during unit startup. The licensee agreed that this arrangement needs to be modified to meet seismic requirements (reference commitment CTS 2022). Another item concerns tests for single filament lamp indicators that are only illuminated when some condition exists. The licensee committed to replace these lamps with multi-filament lamps if their evaluation shows this to be feasible (reference commitment CTS 2023).

The inspectors performed a walkdown of some of the 18 items remaining to be completed, e.g., plans to rearrange some of the annunciators, re-scaling some instrumentation, relabeling some components, relocating some controls, etc. These items, when complete, will assist the operators in performing their functions.

f. Review of Firewatches

During the inspection period, the licensee had three JCOs in effect to assign compensating actions for degraded Appendix R equipment. One of the compensating actions was to station fire watches to periodically monitor specific areas in the plant. The inspectors reviewed JCO C-92-005, Thermolag Fire Barriers, Revision C; C-92-001, Justification For Appendix R Fire Walls, Revision 0; and 89-3-002, Justification For Appendix R Compensatory Actions. The JCOs required that fire watches periodically monitor the Unit's 1 and 2 cable vaults, ESGRs, turbine building, and MER 3 and 4. The inspectors interviewed fire watch personnel and observed them inspect the applicable areas. The inspectors concluded that the fire watch personnel were properly performing actions required by the JCOs.

Within the areas inspected, one non-cited violation was identified.

4. Maintenance Inspections (62703) (42700)

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

a. Installation of CC Water Pump Oil Sample Lines

On January 26, the inspectors witnessed the oil sample line installation on the forward and rear motor bearing oil reservoirs for CC water pump 1-CC-P-1C. WO 3800092589, procedure MMP-C-G-290, Metal Tubing and Swagelok Installation, dated April 30, 1989, and EWR 85-668, Predictive Analysis Oil Sample, were utilized to accomplish this maintenance.

The inspectors observed the maintenance personnel makeup Swagelok fittings and verified that it was accomplished in accordance with the procedure. The inspectors also reviewed EWR 85-668 and verified that the sample lines were installed as specified in the drawing. No discrepancies were noted.

b. RFO Planning

The planning department implemented an innovative computer system to enhance safe operation during the upcoming Unit 2 RFO. The program also reduces the planning department's dependence on the operations department for input on scheduling RFO maintenance items. Planning and station nuclear safety departments have assigned a critical safety parameter rating to every scheduled Unit 2 RFO work item. A green rating indicates that the condition created by the loss of a component or system due to maintenance is satisfactory, yellow indicates that administrative controls are required to ensure an acceptable margin of safety, orange indicates contingency actions are required to ensure acceptable margins of safety, and red indicates that the safety margin is unacceptable. The maintenance item ratings have been computerized and on any given day during the outage, planning will be able to identify the number of green, yellow, orange, or red rated maintenance items. Maintenance items are scheduled by planning to maximize plant safety. For example, all maintenance items that require reduced inventory were rated as red and have been scheduled when the fuel is removed from the reactor and being stored in the fuel pool.

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.

a. Testing Number 3 EDG

After the Unit 1 reactor/turbine trip on January 8, the number 3 EDG came up to speed and since no loss of off site power was experienced, it was not required to take any emergency electrical loads (reference paragraph 3.b). When the licensee tried to secure this diesel, it would not stop when the manual push-button switch was activated. Even with this condition, the EDG would have been able carry its emergency electrical loads had this function been required. The licensee placed the switch in the exercise position and was then able to stop the diesel. Since the EDG could not be automatically started, it was declared inoperable. A modified periodic test, O-OPT-EG-002, Number 3 Emergency Diesel Generator Monthly Fast Start Exercise Test, dated September 3, 1992, was used to test the EDG to insure operability. After the successful test, it was returned to service.

The test included the following: the EDG fuel racks were held in the no fuel position while the electricians verified that the SI relay was deenergized and that a voltage between certain contacts was absent (indicating no SI signal present). Since no SI signal was present, an SI signal was induced by placing jumpers across certain contacts and the EDG started properly. The engine push-button switches were then depressed and the engine-cool-down to stop was activated. The engine stopped in 7 minutes and 50 seconds which falls outside of the test cool down period of 9 minutes and 30 seconds to 13 minutes and 30 seconds. This is not an operability problem, since the cooldown cycle is to minimize wear of the EDG. The engineering analysis isolated the failure of the diesel to stop after the trip to one or both of the relays associated with the cool down cycle. Since this was not an operability problem, these two relays will be replaced during the upcoming outage. No discrepancies were noted by the inspectors.

Within the areas inspected, no violations were identified.

6. Safety Assessment and Quality Verification (40500)

a. Performance Annunciator Program

The inspectors reviewed the results of the Performance Annunciator Program for the third quarter of 1992. The purpose of this program is to evaluate and assess station performance. It is performed quarterly, and the major areas evaluated are personnel, equipment, and program performance.

The specific areas evaluated under personnel performance are operations, maintenance, radiological protection, site services, engineering, and station support. Each area is categorized as a significant strength, satisfactory, improvement needed, or a significant weakness. Most areas have a criteria specified, such

as, the number of station deviations, LERs, or NRC violations that occurred during the quarter. These criteria determine the area category. Areas that do not have criteria specified are classified based on individual judgement; However, the MRB can change the classification of any area based on their judgement.

The 1992 third quarter Performance Annunciator Program results were that all major areas, with the exception of system material condition, were classified as a significant strength or satisfactory. The system material condition window was classified as needing improvement. Specifically, instrument air, SW, heating ventilation & air conditioning, and radiation monitor windows were identified as needing improvement. The inspectors reviewed previous Performance Annunciator Program assessments and concluded that these same systems have a history of being classified as a weakness or needing improvement. The inspectors reviewed the problems with system engineers and management, and noted that long term corrective actions were being developed.

The inspectors concluded that the Performance Annunciator Panel Program was an excellent tool for assessing station performance. The corrective actions for areas identified as needing improvement in the material condition area were long term. As a result, the day to day material conditions problems will continue to exist until the long term corrective actions are fully implemented.

b. Monthly QA Meeting

The inspectors continued to meet with QA personnel on a monthly basis to discuss recent QA assessments and audits. One topic discussed was the recent licensee's fitness for duty audit results. 10 CFR 26, Appendix A, requires that licensees assess their testing facility by routinely processing blind test specimens. The audit identified that personnel at the Surry and North Anna test facilities could identify the foreign substance(s) in the blind test specimens prior to analyzing the contents. Eventually, over a period of time, the observation of the dot arrangement on the lid of the test samples by test facility personnel allowed them to surmise the foreign substance before sampling. Even though the station test facility personnel knew the specimens were test samples, they had to do an analysis to determine the quality of the foreign substance in these samples. To preclude further occurrence of this issue, the licensee instructed the vendor for blind test specimens to remove the dots from the lid. The inspectors considered that this was an example of a good audit finding.

Within the areas inspected, no violations were identified.

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

(Closed) VIO 280,281/91-14-01, Failure to provide adequate procedures and/or instructions with two examples. This issue involved failure to provide adequate instructions and/or procedures (1) when implementing revision to TS 3.11 regarding WGDT hydrogen and oxygen limitations and (2) for the operation of the turbine generator load limiter. The issue associated with WGDTs was previously identified at the North Anna facility, but did not prevent recurrence of this similar violation at Surry. The licensee responded by letter dated August 7, 1991. In this letter, the licensee stated the following corrective actions:

> The annunciator response procedures were revised to include required actions when hydrogen and oxygen concentrations in the WGDTs exceed TS limits.
>
> Procedures were revised to provide instructions for adding nitrogen to the WGDTs.
>
> The process for reviewing TS changes was strengthened.
>
> CNS will review problems that occur at the Surry or North Anna stations and take the appropriate actions to ensure that corrective actions are implemented at both stations.
>
> Revise procedures and the RO training program to instruct operators to set turbine limiters just above 100 percent thermal power when the units are operating at 100 percent thermal power.

The inspectors reviewed annunciator response procedure DW-C9, Waste Gas Decay Tank Hi Oxygen, Revision 1, and OP-23.2.3, Release of Waste Gas Decay Tank 1A, Revision 2, and verified that they contained the appropriate instructions for high oxygen concentration in the WGDTs. The inspectors discussed the process for reviewing TS changes with the Superintendent of Operations and concluded that it was strengthened by the use of CTS items to ensure adequate review. The inspectors reviewed 1-GOP-1.6, Power Operations 25%-30% to Max Allowable Power, Revision 3, and verified that it contained the appropriate instructions for setting the turbine load limiter. The inspectors also reviewed RO training program lesson plans ND-89.2-LP-7, Turbine Control, Revision 3, ND-94-SM-5, and Integrated Plant Operations, Revision 1, and verified that they contained the appropriate instructions for setting the turbine load limiter.

The inspectors reviewed the licensee's corrective actions to ensure that they addressed implementation at both stations. CNS performs formal, indepth analysis of NRC violations, Licensee Event Reports, Root Cause Evaluation, and Human Performance Enhancement Evaluations as part of the OER program. The inspectors reviewed the OER Analysis Report Closure Summary for NA LER 92-15, Missed Surveillance on the Hydrogen Analysis System Trouble or Hi Hydrogen Annunciator Alarm Due to Incorrect Relay,

and verified that CNS evaluated this problem for Surry. The OER summary concluded that there was not a similar problem at the Surry facility. Guidelines in VPAP-3002, Operating Experience Program, Revision 1, state that routine analysis reports should be completed and issued within 90 days. The inspectors noted that the NA problem was identified on June 21, 1992, and the OER Analysis Report Closure Summary was dated December 1, 1992, which exceeded the VPAP-3002 ninety day guidelines. The inspectors reviewed OER Analysis Report Closure Summaries for LER 92-009-S2, LER 92-011-N, and LER 92-007-N2 and noted that they were also not completed within the 90 day guidelines. The inspectors concluded that the CNS Analysis Report Closure Summaries were quality reports; however, they were not completed within the suggested 90 day OER Program guidelines. This program could be more effective if the report closure summaries were completed within the suggested guideline time restraints.

(Closed) VIO 50-281/91-21-01, Inoperability of RMT Interlocks With RMT Key Switches in the Refueling Position. This issue involved the licensee incorrectly interpreting TSs and allowing operator manual action to initiate RMT in lieu of automatic initiation. The licensee responded to the violation in a letter dated October 15, 1991. In that letter the license stated the following corrective actions:

> A TS change would be submitted to add explicit operability requirements for the RMT System.
>
> Restrictions on the use of administrative control would be initiated to ensure that manual operator action is not substituted for automatic TS functions.

The inspectors verified that the licensee has submitted a TS change to address RMT interlocks. The licensee expects approval of the TS change in March 1993. The inspectors previously reviewed the licensee's actions to ensure manual operator action is not inappropriately substituted for automatic TS action. This was discussed in NRC Inspection Report Nos. 50-280,281/92-23 and the licensee's corrective actions were adequate.

Within the areas inspected, no violations were identified.

8. Exit Interview

The results were summarized on February 10, 1993, 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
VIO 50-280,281/91-14-01	Closed	Failure to Follow Procedure and/or Instructions With Two Examples (Paragraph 7).

VIO 50-281/91-21-01	Closed	Inoperability of RMT Interlocks With RMT Key Switches in the Refueling Position (Paragraph 7).
NCV 50-280/93-03-01	Closed	Spurious SI Caused by Engineering Error (Paragraph 3.c).

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

9. Index of Acronyms and Initialisms

CC	-	COMPONENT COOLING
CFR	-	CODE OF FEDERAL REGULATIONS
CLS	-	CONSEQUENCE LIMITING SAFEGUARD
CNS	-	CORPORATE NUCLEAR SAFETY
CTS	-	COMMITMENT TRACKING SYSTEM
ECCS	-	EMERGENCY CORE COOLING SYSTEM
EDG	-	EMERGENCY DIESEL GENERATOR
ESGR	-	EMERGENCY SWITCHGEAR ROOM
EWR	-	ENGINEERING WORK REQUEST
IR	-	INSPECTION REPORT
JCO	-	JUSTIFICATION FOR CONTINUED OPERATION
LER	-	LICENSEE EVENT REPORT
MER	-	MECHANICAL EQUIPMENT ROOM
MRB	-	MANAGEMENT REVIEW BOARD
NA	-	NORTH ANNA
NCV	-	NON-CITED VIOLATION
NRC	-	NUCLEAR REGULATORY COMMISSION
NRR	-	NUCLEAR REACTOR REGULATION
OER	-	OPERATIONAL EVENT REVIEW
PORV	-	POWER OPERATED RELIEF VALVE
PT	-	PERIODIC TEST
RFO	-	REFUELING OUTAGE
RO	-	REACTOR OPERATOR
RCE	-	ROOT CAUSE EVALUATION
RCS	-	REACTOR COOLANT SYSTEM
RMT	-	REFUELING MODE TRANSFER
SER	-	SAFETY EVALUATION REPORT
SI	-	SAFETY INJECTION
SW	-	SERVICE WATER
TS	-	TECHNICAL SPECIFICATION
VIO	-	VIOLATION
WGDT	-	WASTE GAS DECAY TANK
WO	-	WORK ORDER