



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION II  
101 MARIETTA STREET, N.W.  
ATLANTA, GEORGIA 30303

Report Nos.: 50-280/78-21 and 50-281/78-21

Docket Nos.: 50-280 and 50-281

License Nos.: DPR-32 and DPR-37

Licensee: Virginia Electric and Power Company  
P. O. Box 26666  
Richmond, Virginia 23261

Facility Name: Surry Power Station

Inspection at: Surry, Virginia

Inspection conducted: August 15-18, 1978

Inspector: P. T. Burnett

Approved by: R. D. Martin  
R. D. Martin, Chief  
Nuclear Support Section No. 1  
Reactor Operations and Nuclear Support Branch

9/26/78  
Date

Inspection Summary

Inspection on August 15-18, 1978 (Report Nos. 50-280/78-21 and 50-281/78-21)

Areas Inspected: Routine, unannounced inspection of plant operations and startup testing (Unit 1). One inspector spent 29 hours on site.

Results: One item of apparent noncompliance was identified in the subject area of startup testing: an infraction for a trip system setting higher than the limiting safety system setting. See Details I, paragraph 5 (280/78-21-03).

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Details I

Prepared by:

P. T. Burnett  
P. T. Burnett, Reactor Inspector  
Nuclear Support Section No. 1  
Reactor Operations and Nuclear  
Support Branch

20 Sep 78  
Date

Dates of Inspection: August 15-18, 1978

Reviewed by:

R. D. Martin  
R. D. Martin, Chief  
Nuclear Support Section No. 1  
Reactor Operations and Nuclear  
Support Branch

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1. Persons Contacted

Virginia Electric and Power Company (VEPCO)

- \*W. L. Stewart, Superintendent of Station Operations
- \*L. A. Johnson, Supervisor of Engineering Services
- \*J. L. Wilson, Operating Supervisor
- \*F. L. Rentz, QA Supervisor
- \*E. P. DeWandel, Administrative Assistant
- G. E. Kane, Assistant Operating Supervisor
- L. Curfman, Engineer
- #E. J. Lozito, Supervisor Nuclear Fuel Operations Group

\*Indicates attendance at the exit interview on August 18, 1978.  
#Indicates contact was by telephone only.

2. Licensee Action on Previous Inspection Findings

Not addressed.

3. New Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance or deviation. Two unresolved items disclosed during the inspection are discussed in paragraph 5.a.

4. Exit Interview

A meeting was held on April 18, 1978 with Mr. W. L. Stewart, Superintendent of Station Operations, and members of the plant staff as indicated in paragraph 1. The scope and findings of this inspection were presented.

The apparent item of noncompliance discussed further in paragraph 5b, was discussed during the meeting in some detail. The inspector emphasized that the basis of the item was not the failure to report but a failure to take adequate corrective action.

The licensee made a commitment that P.T.-28.11 (Appendix B) would be modified to insure that both positive and negative reactivity insertions were used to calibrate the reactivity computer in future use.

5. Post Refueling Start-up Tests (Unit 1 Only)

Performance of zero-power-physics tests and power-escalation tests for the post refueling start-up of Unit 1 were controlled by "Refueling Physics Test Schedule, Surry 1 Cycle 5" (RPTS), a document which had been reviewed and approved by the System Nuclear Safety and Operating Committee. By review of the engineering services log for the period spanning the tests described in the RPTS and by review of the summary data sheets prepared at the end of each test, the inspector confirmed that the tests had been performed as required and met the stated numerical or regulatory acceptance criteria with the exceptions which will be noted below.

a. Core Flux and Power Distribution

Core flux maps, used to derive the core power distribution, were performed at zero power and nominal power levels of 40, 50, 60 and 70% of rated thermal power. Prior to exceeding 75% power the results of these maps were evaluated in conformance with Technical Specifications 3.12.B.2 to confirm the hot channel factors met the requirements of that specification. Succeeding movable detector maps of core flux and power were made at 75 and 100% power. In reviewing the summary data sheets for each of these tests the inspector noted that the equation for  $FQ(Z)$  used as the acceptance criterion for each test did not conform to the equation given in Technical Specification 3.12.B.1. In discussions of this matter with licensee personnel, including those responsible for preparing Technical Specifications, the licensee took the position that the form of the equation in Technical Specifications was incorrect and was evidently the result of a typographical error of long standing. Subsequent to the inspection the inspector discussed this subject by telephone with members of NRR. Their initial response was that the published form did appear to be in error and that they would research the problem further to determine exactly the form of the equation and the magnitude of the constants appearing in it. This form and magnitude of the equation defining  $FQ$  has been identified as unresolved item 280/281/78-21-01.

The licensee had identified 98% of rated power as the threshold power for which extensive surveillance of the axial power distribution is required. This requirement is identified in Technical Specification 3.12.B.2.B.(2). The licensee's procedure to implement the required surveillance is PT-28.4. Under the section on frequency in that periodic test reference is made to Technical Specification 3.12.B.1.A, a technical specification that does not exist. Pending a determination by Region II of whether this is a typographical error or the result of a failure to adequately review procedures following a change in Technical Specifications, this item has been identified as unresolved item 280/281/78-21-02.

b. Nuclear Instrument Calibrations

With each of the movable detector generated flux maps discussed above, one or more calorimetric determinations of reactor power were made. That calorimetric or heat balance calculation is part of PT-35, "Reactor Power Calculations". Review of the completed PT-35's for this period indicated that significant differences existed between the nuclear instruments and the power as determined by heat balance. At 50% thermal power the nuclear instruments after adjustment read 40%. The licensee attempted to adjust the high flux trip set point by reducing it by 11%, slightly more than the indicated difference. At 57% thermal power, the nuclear instruments averaged slightly over 43%, and at 67% thermal power the nuclear instruments indicated 55%. At 88½% thermal power the nuclear instruments read 70%, and at this point the licensee again readjusted the high flux trip set point down to 93% from the earlier readjustment to 96%. The heat balance calculations and records of nuclear instruments readings that accompanied flux maps S1-5-4, -5, -6, -7 and -8 indicated that the ratio of nuclear instrument readings to the thermal power was a nominal .8 for that series of observations. With a limiting Safety System Setting for the high flux trip according to Technical Specification 2.3.A.2(a), of 109% of rated thermal power, the trip set point should have been about 87% indicated thermal power with the existing discrepancy between thermal-power measurements and nuclear-instrument indications. The results, since the discrepancy was a result of ratio or gain adjustment rather than offset, was that the limiting Safety System Setting was a nonconservative 116% of rated thermal power. This has been identified to the licensee as a possible item of noncompliance 280/78-21-03. By use of PT 28.2, PT 28.8 and PT28.9 the licensee completed the calibration of the excore nuclear instruments, bringing them into agreement with indicated thermal power, and established the correlation between incore measurements of axial flux difference and excore indications of axial flux difference.

c. Calibration of the Reactivity Computer

Review of the licensee's check-out of the reactivity computer for this series of tests, as performed using PT 28.11 Appendix B, revealed that only positive reactivity insertions were used in the calibration although it was used to measure both positive and negative reactivity. This was discussed with licensee personnel and in the course of the exit interview licensee management made a commitment to change that procedure to require both positive and negative reactivity insertions for calibration in future applications of that procedure.

d. Power Coefficient of Reactivity Measurements

Measurement of the power coefficient was the last test performed in this series and final data reduction had not been completed. However preliminary results indicated an acceptable power coefficient. Review of the procedure used, PT-28.12, which is limited to the collection of data for the measurement and does not include analysis of the data, raised no questions.

6. Reactor Shutdown Margin and Estimated Critical Positions

When a unit is actually shutdown OP-1F is used to determine the unit shutdown margin. Completed copies of this procedure for the most recent shutdown of each unit were reviewed in the vault and found satisfactory. OP-1C is used for making estimated critical positions prior to unit startup. The licensee has recently revised that procedure requiring additional review by the shift supervisor when it is used, but the revision has not changed the method of performing the calculation. Some of the more recently completed ECP's for both units were checked for numerical correctness and found satisfactory. Data used were spot checked against the source data in Plant Curve Book and were found to be the proper data for calculations. The licensee experience in using OP-1C prior to its recent revision is addressed in IE Rpt. 78-22.