



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

Report Nos.: 50-338/78-40 and 50-339/78-35

Docket Nos.: 50-338 and 50-339

License Nos.: NPF-4 and CPPR-78

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

Facility Name: North Anna Power Station, Units 1 and 2

Inspection at: North Anna Power Station, Mineral, Virginia

Inspection conducted: November 6 - December 8, 1978

Inspector: M. S. Kidd
Resident Reactor Inspector

Accompanying Personnel: None

Approved by: W T C. L.
R. C. Lewis, Chief
Reactor Projects Section No. 2
Reactor Operations and Nuclear Support Branch

12/28/78
Date

Inspection Summary

Inspection on November 6 - December 8, 1978 (Report Nos. 50-338/78-40 and 50-339/78-35)

Unit 1 Areas Inspected: Routine inspection by the resident inspector of licensee events and event reports, spent fuel pit embedments, and settlement of Class I structures. The inspections involved 16 manhours by the NRC resident inspector.

Unit 2 Areas Inspected: Routine inspection by the resident inspector of preoperational testing, quality assurance for preoperational testing, conduct of plant tours, and comparison of installed systems to FSAR drawings. The inspections involved 36 manhours by the NRC resident inspector.

Results: Within the areas inspected, no items of noncompliance or deviations were identified.

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DETAILS I

Prepared by: WT Cate
M. S. Kidd, Resident Inspector
Reactor Projects Section No. 2
Reactor Operations and Nuclear
Support Branch

12/24/78
Date

Dates of Inspection: November 6 - December 8, 1978

Reviewed by: WT Cate
R. C. Lewis, Chief
Reactor Projects Section No. 2
Reactor Operations and Nuclear
Support Branch

12/26/78
Date

1. Persons Contacted

Virginia Electric and Power Company (VEPCO)

W. R. Cartwright, Station Manager - 1/3/4
J. R. Eastwood, Maintenance Mechanics
I. B. Ferrer, Assistant Engineer
L. O. Goodrich, Supervisor - Mechanical Maintenance
S. L. Harvey, Operating Supervisor
M. A. Harrison, Construction QC Engineer
J. R. Harper, Instrument Supervisor - 4
J. D. Kellams, Superintendent - Station Operations - 2/4
D. G. McLain, Engineering Supervisor - 2/3
P. A. Slatter, Resident QC Engineer - Construction - 1
E. R. Smith, Jr., Supervisor - Engineering Services - 2/3
R. C. Sturgill, Assistant Engineer - 4
D. C. Woods, Senior Engineering Technician - 3/4

Stone and Webster Engineering Corporation (S&W)

D. P. Barry, Resident Engineer
M. J. Dunston, Construction Acceptance Testing Engineer
W. M. Matajek, Flushing and Component Cooling System Engineer
R. E. Miller, Mechanical Inspector - FQC

Hartford Steam Boiler Inspection and Insurance

H. A. Webster, Authorized Nuclear Inspector

- 1) Denotes those attending management interview on November 9, 1978.
- 2) Denotes those attending management interview on November 22, 1978.
- 3) Denotes those attending management interview on December 1, 1978.
- 4) Denotes those attending management interview on December 8, 1978.

2. Licensee Action on Previous Inspection Findings

(Open) Unresolved Item (338/78-37-04): Settlement Monitoring Program for Class I Structures. Additional findings on this item are given in IE Report Nos. 50-338/78-44 and 50-339/78-37.

3. Unresolved Items

No new items identified.

4. Management Interviews

Management interviews were conducted November 9 and 22 and December 1 and 8, 1978, with station management and other licensee staff members denoted in paragraph 1. All subjects presented in these DETAILS were discussed.

5. Spent Fuel Pool Embedments

During the inspection period, the inspector was requested by the Region II Office of Inspection and Enforcement to review the "two additional" embedments in the floor of the spent fuel pool as discussed in VEPCO's letter to NRR, serial number 537, dated September 22, 1978. This review was conducted November 7, 1978, to determine when and how the embedments had been made. The following documents were reviewed:

- a. Engineering and Design Coordination Reports (EDCR) P1429A-D, P1585, 5877-1 and 5895-1. These dealt with installation of the spent fuel pit north wall counterfor, added to increase the structural integrity of the wall (see FSAR Figure 1.2-17); installation of the spent fuel cask pit separating wall; and installation of the two additional embedments.
- b. Field Quality Control (FQC) Inspection Reports of various dates from February 22, 1977 through May 12, 1977. These documented inspections of work performed on the counterfor, cask well, and new embedments.

- c. Changes to Purchase Order No. 442 dated December 13, 1976 and October 27, 1977. These changes, plus a letter number NAS-9615, dated March 23, 1977, from S&W to VEPCO, confirm the addition of a new Type B rack (6X4 spaces) which would be added as part of the proposed increase of storage capacity. The referenced letter stated that two new embedments would be needed for the Type B rack, in that it would be located where no rack had been placed before.
- d. S&W Drawings FM-3A, Revision 8 and FM-3U, Revision I, which depict the new rack location and its support pads or anchors.

Review of the documents above and discussions with S&W Engineering and VEPCO QA personnel revealed that the "additional" embedments had been installed in the Spring of 1977, while the pool liner was undergoing modifications because of the counterfor and cask wall installations. Also, the inspector established that the new embedments were installed in the same manner as all other rack embedments. There were no further questions in this area.

The high density racks have not yet been installed in the fuel pool, in that approval for their use has not been given by NRR. They have been fabricated and are currently in storage on site.

6. Licensee Event Reports Review (Unit 1)

The following LER's were reviewed to verify that reporting requirements had been met, causes had been identified, corrective actions appeared appropriate, generic applicability had been considered, and the LER forms were complete. Additionally, for those reports identified by asterisk, a more detailed review was performed to verify that the licensee had reviewed the events, corrective actions had been taken, no unreviewed safety questions were involved, and violations of regulations or license/Technical Specification conditions had been identified.

- a. 78-089/03L-0: High Steam Flow Bistable Failure. The event date indicated on Revision 0 of this LER, September 5, 1978, would dictate that the written report be transmitted to NRC by October 5, 1978. The actual report date was October 10. Discussions with plant personnel revealed that the event date was actually September 15, and a corrected LER had been submitted. The corrected LER (78-089/03X-1) was submitted November 14, 1978. There were no further questions on this LER.
- b. 78-090/02-0* Axial Flux Difference (AFD) Greater Than Five Percent From Target. As noted in the LER, five previous instances of AFD deviating more than five percent from target had not been reported

as LER's due to misunderstanding on the part of licensee personnel. Four of the five instances occurred during startup testing. During discussions on this matter with station management, the inspector noted that these examples of late reporting had been identified by the licensee and corrective measures taken. In that the misunderstanding had been clarified, the inspector had no further questions.

- c. 78-091/03L-0 Reactor Coolant Flow Channel II Setpoint Nonconservative. As noted in the LER, a procedure error resulted in an incorrect, nonconservative setpoint for this flow channel. Discussions with station personnel revealed that the channel was recalibrated using the Procedure Deviation method of correcting the procedure. The procedure, along with identical ones for the other channels had not been revised at the conclusion of the inspection, thus this will be reinspected at a later time (Open Item 338/78-40-01).
- d. 78-092/03L-0 Steam Generator 1B Level Channel III Setpoint Drift
- e. 78-093/03L-0 Steam Flow - Feed Flow Mismatch Comparator Setpoint Drift
- f. 78-094/03L-0* Two Containment Isolation Valves Failed to Close During Test. This event involved the failure of two component cooling water isolation valves to close due to problems with their associated solenoid-operated valves. These solenoids have been scheduled for replacement, at which time they will be disassembled and inspected to determine the cause for their reluctance to operate. This matter will be reinspected (open item 338/78-40-02) to review corrective actions following replacement and inspection.
- g. 78-095/03L-0 Pressurizer Pressure Channel Setpoint Drift
- h. 78-096/03L-0 Empty Fluid Reservoir on Snubber 1-RC-HSS-861
- i. 78-097/03L-0 Empty Fluid Reservoir on Snubber 1-RC-HSS-873

Except as noted above, the inspector had no questions concerning these event reports.

7. Plant Tours (Units 1 and 2)

Tours were conducted on November 8 and 21 and December 4, 1978, of selected plant areas, with emphasis on Unit 2. The tour of November 21 was made in conjunction with a tour conducted by the inspector for members of the NRC Executive Legal Director's Office. During those tours, the following items, as available, were observed:

a. Hot Work

Adequacy of fire prevention/protection measures used.

b. Housekeeping

Minimal accumulations of debris and maintenance of required cleanliness levels in systems under or following testing.

c. Equipment Preservation

Maintenance of special preservative measures for installed equipment as applicable.

d. Component Tagging

Implementation and observance of equipment tagging for safety or equipment protection.

e. Instrumentation

Adequate protection for installed instrumentation.

f. Communication

Effectiveness of public address system in all areas toured.

g. Equipment Controls

Effectiveness of jurisdictional controls in precluding unauthorized work on systems turned over for testing.

h. Foreign Material Exclusion

Maintenance of controls to assure systems which have been cleaned and flushed are not re-opened to admit foreign material.

i. Security

Implementation of security provisions. Particular attention to maintenance of the Unit 1/Unit 2 interface.

j. Logbooks

The Unit 2 control room operator's log was observed November 20, 1978, for entries concerning quench spray flushing activities, such as pump starts and stops and flow rates.

k. Testing

Conduct of the pressurizer relief tank hydrostatic test and portions of the quench spray header flushing activities were observed as reported in paragraph 8 of these DETAILS.

No discrepancies were noted for those activities observed when compared to the applicable NAS standard or other guidance, such as the Station Security and Emergency Plans.

8. Test Witnessing (Unit 2)

The following test activities, conducted by S&W Advisory or Construction Acceptance Testing (CAT) groups were witnessed by the inspector:

a. Quench Spray Headers Flushing

Portions of the flushing of quench spray (QS) headers A and B were observed on November 7, 20 and 21, 1978. The flushing was conducted per S&W Advisory procedure AD-OPS-2-P-7, dated August 16, 1978. The controlling document for flushing activities is specification NAS 407, "Specification for Cleaning of Components During Construction," Revision 4, dated April 28, 1978. On November 7, header B was being flushed and the inspector observed the removal and inspection of a temporary strainer installed in the containment downcomer line (8-inch -QS-442-153) after a short period of pump flow. The strainer contained several cubic inches of sand, dirt, tape and other debris, with two particles larger than the maximum permissible size of three-sixteenths of an inch. The following week, this header was proof flushed during a thirty minute run and found acceptable by S&W Advisory and FQC while the inspector was off-site.

On November 20, the inspector observed the strainer removal from A header downcomer. On that date, one piece of red tape, approximately one-eighth inch by one-half inch was found, negating otherwise acceptable flush. The A header was proof flushed November 21, while the inspector was conducting a tour for other NRC personnel and thus unable to witness the evolution.

Specific items observed during the above activities included the following:

- (1) Proof flushes were conducted at QS pump flow rates of about 2,300 and 2,100 gpm each.

- (2) The acceptance criterion of three-sixteenths inch maximum particle size is consistent with the information in the FSAR Supplementary Section response to NRC comment 6.5.3. Interpretation of findings in the strainer relative to the acceptance criterion was found acceptable.
- (3) Piping and valve lineups appeared to be proper.
- (4) Flush water quality was found to be consistent with NAS407 by review of chemistry results for the Unit 2 refueling water storage tank (2-QS-TK-1) on November 20.
- (5) QS pump suction and discharge pressure gauges and flow gauges were observed to have current calibration stickers.
- (6) Portions of the completed procedure dealing with flushing (it also covers pump flow verification) were reviewed November 27. Appropriate entries had been made; no discrepancies were noted.

Within the scope of observations made, no discrepancies were noted for these activities.

b. Pressurizer Relief Tank Hydrostatic Test

The unit 2 pressurizer relief tank (PRT) hydro, conducted November 20, 1978, was witnessed by the inspector. The hydro was conducted per FQC procedure QC 15.2, "Inspection Requirements for Hydrostatic Testing of Installed Systems", Revision A, dated November 11, 1978, as it relates to Category II and III systems. Non-isolable piping to and from the PRT was also hydroed in accordance with USAS B31.7-1969 to 150 psig. This test was designated as Hydro Test RC-53. The following observations were made:

- (1) Value lineups appeared to be in accordance with boundaries delineated on marked up copies of S&W drawings FM-94A, FM-95C, FM-90A, FM-93B, and Engineering and Design Coordination Report (EDCR) 25590-2. One anomaly was discovered by test personnel when trying to pressurize the PRT, namely a drain valve on the residual heat removal (RHR) relief valves header to the PRT, not shown on the revision used to define boundaries, was open. A later revision, number 9, of FM-39A does show the valve, but it does not show on the latest operating valve drawing FM-94A-5. FM-39A and FM-94A are essentially identical except that 94A and others in the higher numbered series designate valve

types. The lower series numbered prints are used in the Units 1 and 2 FSAR. This discrepancy concerning the RHR drain valve will be reinspected and is designated as an open item (339/78-35-01).

- (2) A Hydrotest Report (RC-53) had been prepared to the extent required by QC-15.2 and was present at the test location along with marked-up drawings defining these boundaries. Also available were piping isometrics showing weld locations. These were used to document visual inspection by FQC.
- (3) All welds under tests were free of insulation or other obstruction.
- (4) Installed test gauges and a relief valve had current calibration stickers.
- (5) Test pressure was maintained for greater than ten minutes, the minimum required by USAS B31.7.
- (6) No discrepancies, such as through-wall leaks, were observed by FQC, the Authorized Nuclear Inspector, the test engineer, or the NRC inspector.

On November 28, 1978, the inspector reviewed the completed Hydrotest Report and isometrics which had been marked-up and signed by FQC to denote inspection of each weld. This documentation appeared to be in order, other than the RHR relief header drain valve problem discussed above, the inspector had no other comments on this test.

9. Comparison of Installed Systems to FSAR Descriptions - Unit 2

10 CFR 50.57 (a)(1) requires, in part, that before an operating license is issued, the facility will have been substantially completed in conformity with the application (FSAR), as amended. As a means of determining the completion status of Unit 2 and the accuracy of FSAR information, the inspector selected the operating valve number flow diagram for the quench spray (QS) and recirculation spray (RS) systems, FM-91A, Revision 7, dated October 28, 1977.

This drawing was compared to FSAR Figure 6.2.2-1 (FM-35A), dated July 7, 1977. Both drawings were then compared to portions of the as-built systems as delineated below. Portions of these systems verified in the field included all reasonably accessible lines, valves, pumps, instruments and other components for the refueling water storage tank (RWST), including lines to and from; the sodium hydroxide addition tank, including lines to and from; QS pumps, their suction and discharge lines; inside and

outside RS pumps, including discharge lines to the RS heat exchangers in containment; and refueling water recirculation pumps and associated piping. Additionally, approximately three dozen valve controllers, parameter indicators, and alarms for these systems were verified to be present in the Unit 2 control room. As of November 30, the spray nozzles in the QS and RS headers had not been completely installed, thus this portion of the system will be inspected at a later date.

Comparison of the drawings and as-built systems resulted in these types of findings:

- a. Improperly tagged piping
- b. Vent and/or drain valves installed in the systems do not appear on the station and/or FSAR drawings.
- c. The casing cooling system interface with QS and RS pumps are not shown on either drawing.
- d. The number of spray nozzles on the inside and outside RS headers are not the same on the two drawings.

Specific findings were presented to station management with the request that differences be reviewed to determine if they had been handled properly, such as through a design change mechanism. The inspector was informed that this would be accomplished. This area will be reinspected and is designated as an open item (339/78-35-02).

During the system walkdown, it was noted that essentially all components were tagged with blue tags indicating they had been turned over from construction to S&W Advisory Operations for initial operations as defined by North Anna Specification 415, "Equipment and System Tagging." No discrepancies were noted with regard to tagging.

10. Observation of System Turnover Audit - Unit 2

On November 28, 1978, the inspector observed audits of two turnover or conditional release packages by a VEPCO quality control engineer. These audits are required by paragraph 5.3 of Section 14.1 of VEPCO's Quality Assurance Manual (Engineering and Construction) and are implemented per Quality Assurance Construction Instruction 14.1, "Conditional Release Auditing." The two conditional release packages audited were 2-117 for the nuclear instrument auxiliary relay racks and 2-126 for the neutron shield tank cooling system. No discrepancies were noted by the QC engineer for release 2-117. Documentation status reports for piping had not been updated to denote completion of reviews by FQC. This was corrected on-the-spot, thus there were no adverse findings resulting from either audit.

No discrepancies were noted by the NRC inspector relative to the audits.

11. Settlement of Class I Structures - Units 1 and 2

As discussed in IE Report Nos. 50-338/78-37 and 339/78-32, certain problems had been identified relative to the monitoring program for settlement of Class I structures (Unresolved item 338/78-37-04 and open item 339/78-32-03). By letter number 646 dated November 22, 1978, VEPCO briefly described these problems for NRR. A meeting was conducted December 5, 1978 in Bethesda, Maryland wherein VEPCO and S&W described these problems and corrective actions being pursued to NRR and IE representatives, including the inspector. More detailed information on the monitoring program is given in IE Report 50-338/78-44 and 50-339/78-37.