



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

Report Nos.: 50-338/85-28 and 50-339/85-28

Licensee: Virginia Electric and Power Company
Richmond, VA 23261

Docket Nos.: 50-338 and 50-339

License Nos.: NPF-4 and NPF-7

Facility Name: North Anna 1 and 2

Inspection Conducted: October 28 - November 1, 1985

Inspector: J. R. Harris 1-8-86
J. R. Harris Date Signed

Approved by: T. E. Conlon 1-8-86
T. E. Conlon, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection entailed 35 inspector-hours on site in the areas of modification to the service water intake structure.

Results: Four examples of a violation of licensee requirements were identified - Failure to control temperature of concrete test cylinders, failure to control moisture content of select fill, failure to meet specified test requirements for slump, air, concrete temperature and aggregates, and document correct quantities of concrete mix ingredients on batch tickets, and failure to have a procedure which implements current specifications.

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *J. R. Adams, Project Manager, Engineering
- *S. B. Dzidzo, Project Manager, Engineering
- *M. W. Gettler, Project Manager
- *L. N. Hartz, Operations Supervisor
- *G. E. Kane, Assistant Station Manager
- *J. Leberstien, Licensing Coordinator
- A. McGilvray, Quality Control (QC) Inspector
- *A. O. Parker, Senior Staff Engineer
- *D. Roth, Quality Assurance (QA) Manager
- *E. R. Smith, Assistant Station Manager
- *F. Terminella, Supervisor QC

NRC Resident Inspector

- *M. W. Branch

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on November 1, 1985, with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings listed below. The findings are four deficiencies which constitute a violation of the licensee's requirements for concrete and soil compaction activities. No dissenting comments were received from the licensee.

Deficiency 338, 339/85-28-01, Failure to control temperature of concrete test cylinders, paragraph 5.

Deficiency 338, 339/85-28-02, Failure to control moisture content of select fill, paragraph 5.

Deficiency 338, 339/85-28-03, Failure to meet specified test requirements for slump, air content, concrete temperature and aggregates and document correct quantities of concrete mix ingredients on batch tickets, paragraph 5.

Deficiency 338, 339/85-28-04, Failure to have a procedure which implements current specifications, paragraph 5.

The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Modifications to Service Water Intake Structure.

This inspection covered examination of specifications, procedures, work activities, and records for ongoing modifications to the Service Water Intake Structure in the areas of structural concrete and foundations. Controlling specifications and procedures examined by the inspector are as follows:

- ° Specification NAS2014, Rev. 3, Supply of Materials, Batching, Mixing and Delivery of Ready Mix Concrete
- ° Specification NAS2029, Rev. 1, Placement of Concrete and Reinforcing Steel
- ° Specification NAS3003, Rev. 1, Excavation, Fill and Backfill, Service Water Buried Piping Installation
- ° Work Procedure WP-106, Rev. 0, Excavation and Backfill
- ° Work Procedure WP-105, Rev. 0, Construction Work Procedure, Concrete
- ° QCI 10.1 Rev. 0, Civil Inspection

Work examined included completed concrete walls and slabs in the intake structure and ongoing concrete placements. The inspector also examined the concrete and soils testing laboratory for currentness of calibration of test equipment and environmental controls of the concrete curing room. Concrete records examined included qualification tests for the cement, aggregate, water, admixtures and reinforcing steel used in the concrete placements; batch tickets; strength results of the concrete test cylinders; and environmental control data for the concrete test cylinder curing room. Foundation records examined included laboratory proctor test data (standard used for field compaction controls), field density tests, and moisture controls used for compaction of select fill in the service water reservoir buried pipe trench.

Examination of the above resulted in the following deficiencies being identified which constitute a violation of licensee requirements:

- ° Specification NAS2029, Placement of Concrete Reinforcing Steel, requires concrete test cylinders to be controlled in accordance with ASTM C31, Making and Curing Concrete Test Specimens in the Field. This ASTM requires cylinders which are initially cured in the field to be maintained at a temperature of 60°F to 80°F for the first 24 hours and

indicates that a temperature record of the test specimens may be established by means of maximum-minimum thermometers. Following the initial 24 hour curing period, the test cylinders are then required to be stored in a moist condition at $73.4^{\circ}\text{F} \pm 3^{\circ}\text{F}$ until the moment of test.

Contrary to this requirement, no temperature data is available to verify that the test specimens which are initially cured in the field meet the temperature requirements. Also, examination of temperature test data for those test specimens cured in the laboratory curing room showed that the $73^{\circ}\text{F} \pm 3^{\circ}\text{F}$ temperature requirements were not being met during this inspection and numerous times since the batching of Category 1 concrete for modifications to the service water structure. The civil QC inspector issued an NCR on July 1, 1985, reporting curing room temperature violations. Disposition instructions stated that as long as the test cylinders break was within the allowable range no further action will be required and to accept as is. Discussions with the QC inspector indicated that he interpreted this to mean that as long as the test cylinder breaks met strength requirements, that out of specification temperature variations of the curing room could be tolerated. This was identified to the licensee as deficiency item 338, 339/85-28-01, Failure to control temperature of concrete test cylinders.

- o Specification NAS3003, Excavation Fill and Backfill Service Water Buried Piping Installation, paragraph 3.5.2 requires select fill moisture to be controlled to ± 3 percent of the optimum moisture as determined by ASTM D 698, Moisture Density Relations of Soils Using 5.5 lb Rammer and 12 inch Drop.

Contrary to this requirement examination of records for select fill placed on August 27, 1985, September 18, 1985, September 19, 1985, and September 5, 1985 showed that select fill was placed at -7.4, -6.7, -4.9, -4.1, and -3.9 percent of the required optimum moisture. This was identified to the licensee as deficiency item 338, 339/85-28-02, Failure to control moisture content of select fill.

- o Specification NAS2014, Supply of Materials Batching, Mixing, and Delivery of Ready Mix Concrete, specifies that tests for slump, air content and concrete temperature shall be made for each truck delivered, that the amounts of fine and coarse aggregate and water shall be shown on the batch tickets, that aggregate gradation tests shall be performed daily and that 5.4 ounces per cubic yard of concrete or 44 ounces for an 8 cubic yard load as the maximum amount of air entraining agent for the current design mix.

Contrary to these requirements, tests for slump, air content, and concrete temperature were not being made consistently for each truck of concrete delivered; the amount of fine and coarse aggregate was not shown on batch ticket invoice numbers 31876 to 31885, and the amount of water and fine and coarse aggregate was not shown on batch ticket invoice numbers 32021 to 32023; samples for daily gradation tests are

being taken, but testing is about one month behind schedule; and the maximum allowable amount of air entraining agent shown on the batch tickets is 48 ounces for an 8 cubic yard load instead of the 44 ounces specified by the design mix. This was identified to the licensee as deficiency item 338, 339/85-28-03, Failure to meet specified test requirements for slump, air, temperature and aggregates, and document correct quantities of concrete mix ingredients on batch tickets.

- o Procedure QC 10.1 Civil Inspection, is being used to control the inspection and documentation of work related to civil modifications of the service water intake structure. This procedure was written to implement specifications used for construction of Unit 3 which has been cancelled. This procedure is not appropriate for the circumstances in that it does not reference the current specifications being used to control the ongoing modifications. Discussions indicated that applicable procedures are still being drafted. This was identified to the licensee as deficiency item 338, 339/85-28-04, Failure to have a procedure which implements current specifications.

During this inspection, the inspector observed that there was only one QC inspector for the ongoing modification work. The inspector concluded that this did not constitute adequate staff for the level of activity involved and that many of the above listed deficiencies were attributed to the fact that the QC inspector did not have enough time to do a thorough inspection job.

6. Enforcement Conference

On December 18, 1985, W. L. Stewart, Vice President Nuclear Operations, Virginia Electric and Power Company and members of his staff met with A. F. Gibson, Director Division of Reactor Safety and other members of the Region II staff to discuss the findings identified at the exit interview on November 1, 1985 and in a telecon discussion held on November 22, 1985, with members of the licensee and NRC Region II staff. Attendees at the enforcement conference are listed below.

Licensee Attendees:

W. L. Stewart, Vice President, Nuclear Operations
 R. J. Hardwick, Jr., Manager, Nuclear Programs and Licensing
 J. W. Waddill, Executive Manager QA
 E. W. Harrel, Station Manager, North Anna
 N. E. Clark, Director Safety Evaluation and Control
 B. Saunders, Station Manager, Surry
 M. W. Gettley, ESC Project Manager, North Anna
 C. M. Robinson, Manager Civil Engineering
 D. Roth, Manager, QA
 J. M. Davis, ESC Nuclear Projects
 J. MacCrimmon, Supervisor Civil Engineering

NRC Attendees:

A. F. Gibson, Director, Division of Reactor Safety (DRS)
 G. R. Jenkins, Director, Enforcement and Investigation Coordination Staff (EICS)
 A. R. Herdt, Chief, Engineering Branch, DRS
 T. E. Conlon, Chief, Plant Systems Section, DRS
 S. A. Elrod, Chief, Reactor Projects Section, Division of Reactor Projects (DRP)
 K. D. Landis, Chief, Technical Support Staff, DRP
 M. W. Branch, Senior Resident Inspector, North Anna
 S. Guenther, Project Inspector, DRP
 J. R. Harris, Civil Engineer/Geologist, DRS
 J. J. Lenahan, Civil Engineer, DRS
 L. P. Modenos, Enforcement Specialist, EICS

During the discussion, the licensee discussed management issues and technical issues which were related to the deficiencies identified during the NRC inspection conducted from October 28 to November 1, 1985. The licensee indicated work activities had ceased in this area and that they would not resume until all the issues were resolved.

During the presentation of the management issues, the licensee discussed the proximate and root causes of the deficiencies and the corrective actions being taken to resolve the deficiencies. Proximate causes identified were deficiencies in procedures, documentation, pre-work planning, manpower coverage, and equipment problems. The proposed corrective actions were: to issue revised procedures, emphasize procedural compliance, review and disposition existing record errors and omissions, issue procedures addressing conduct of job readiness reviews, increase number of QC inspectors, determine test equipment status and requirements and determine curing room and laboratory equipment status and requirements. Root causes identified were deficiencies in management involvement, personnel communications, the QC inspectors role, and the QA audit program. Proposed corrective actions are: re-emphasize management role in work activities, increase supervisory involvement, establish a testing group, monitor testing activity and increase periodic audits.

In the discussion of the technical issues the licensee indicated that although there were deficiencies in their QA program, they felt the quality of the concrete and backfill were acceptable.

Supporting evidence for the concrete quality was that although the frequency for slump, air, and concrete tests did not meet the once for each truck frequency specified by the specification, they did satisfy the testing requirements of ANSI Standard N45.2.5-1974. This is the Standard which provides supplementary requirements for installation inspection, and testing of structural concrete and structural steel during the construction phase of Nuclear Power Plants. The frequency specified by ANSI N45.2.5 for these tests is the first batch produced each day and for every 50 cubic yards placed. Review of their test data for slump, air concrete temperature, and strength results from the test cylinders showed that they met or exceeded specification and design requirements.

In discussion of the technical issue regarding the backfill, the licensee indicated that review of the design criteria for the backfill indicated that the compaction and moisture content were not significant. This design data was not provided during the licensee's presentation.

At the conclusion of the discussion, the licensee committed to providing the design data supporting their position on the backfill and to inspect the concrete of the service water intake structure to verify that there were no defects in the concrete.