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

Report Nos.: 50-424/86-67 and 50-425/86-41

Licensee: Georgia Power Company
P. O. Box 4545
Atlanta, GA 30302

Docket Nos.: 50-424 and 50-425 License Nos.: CPPR-108 and CPPR-109

Facility Name: Vogtle 1 and 2

Inspection Conducted: July 28 - August 1, and August 22-24, 1986

Inspector: for J. J. Lenahan — Date Signed: 9/18/86

Approved by: F. Jape, Section Chief — Date Signed: 9/19/86
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This routine, unannounced inspection was conducted in the areas of reviewing and witnessing piping thermal expansion and vibration testing, the reactor containment building structural integrity test, previously identified inspector followup items, licensee's action on previously identified enforcement items and followup on employee concerns in concrete construction operations.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

J. G. Aufdenkumpe, Lead Integrated Test Supervisor
*C. E. Bellflower, Quality Assurance Site Manager - Operations
*R. M. Bellamy, Test and Outage Manager
M. E. Chance, Test Supervisor
J. Davis, Test Supervisor
*W. C. Gabbard, Regulatory Compliance Specialist
E. Groover, Quality Assurance Site Manager - Construction
L. Smith, Test Supervisor

Other licensee employees contacted included construction craftsmen, engineers, technicians, operators, mechanics, security force members, and office personnel.

Other Organizations

H. Handfinger, Preoperational Test Superintendent, Bechtel
H. Hill, Structural Engineer, Bechtel
W. Moore, Lead Test Engineer, Westinghouse

NRC Resident Inspectors

H. Livermore, Senior Resident Inspector
J. Rogge, Senior Resident Inspector
*R. J. Schepens, Resident Inspector

*Attended exit interview on August 1

2. Exit Interview

The inspection scope and findings were summarized on August 1 and 24, 1986 with those persons indicated in paragraph 1 above. The inspector described the areas inspected and discussed in detail the inspection findings. No dissenting comments were received from the licensee. 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

(Closed) Unresolved Item (424, 425/84-27-01), Adequacy of Coating Contractor QC Inspection and Application Procedures. During the inspection when this problem was identified, the inspector noted that the contractor's quality control inspector procedures were primarily instructions for completing quality control inspection records and other records necessary to document

the acceptability of the protective coatings. The procedures did not contain inspection acceptance criteria, and did not specify the frequency and level of QC inspections required. Prior to and subsequent to Inspection Report No. 84-77, this problem was identified by the licensee's QA staff during audits of the protective coatings program. As a result, the QC inspection procedures have been revised to include acceptance criteria and detailed inspection requirements. Also, the contractor included a "hold point" inspection system for application and inspection of coatings inside containment. (Coatings in other area are not safety-related.) Based on extensive inspections of coatings performed during review of Readiness Review Module 13B, "Coatings", and in followup of numerous allegations made pertaining to application of coatings (see NRC Inspection Report Nos. 50-424/86-36, 50-425/86-16) the inspector concluded that even though the QC inspector procedure may have been deficient, the coatings had been properly inspected in accordance with criteria contained in the Bechtel specification and the manufacturer's application procedures. No problems had been identified by NRC inspectors during previous inspections of coatings. Unresolved item 424, 425/84-27-01 is closed.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Independent Inspector Effort

The inspector reviewed the disposition of Operations Deficiency Report (ODR) T-1-86-2582. This ODR concerned the apparent unexpected lifting of main steam safety relief valve 1-PSV-3011 in the loop 2 main steam line during the hot functional testing. Unfortunately, since the pen strip chart which records pressure in the loop 2 steam generator was inoperable when this event occurred, the system pressure at the time the valve lifted could not be determined. In order to resolve this problem, the licensee temporarily restrained valve 1-PSV-3011 to permit continuation of the hot functional test. The licensee then checked the setpoint on eight of the 20 main steam safety relief valves (two for each loop). This testing was conducted in accordance with Crosby Test Procedure No. T-1652. The inspector witnessed testing of main steam safety relief valves 1-PSV-3012, 3021, and 3023. The results of the tests showed that the set points for all valves tested were within tolerance (plus or minus one percent of the setpoint).

As a result, the licensee concluded that the valves were properly adjusted and that no deficiency existed. The restraint was removed from valve 1-PSV-3011 and the ODR was dispositioned as invalid since no deficiency existed. The test results indicated that an increase in Loop 2 system pressure caused the relief valves to lift at their setpoint in accordance with their design characteristics.

Within the areas inspected, no violations or deviations were identified.

6. Thermal Expansion Test (70370)

The inspector examined the thermal expansion test procedures, observed a portion of the thermal expansion test, and reviewed test data. Acceptance criteria utilized by the inspector appear in final Safety Analysis Report (FSAR) Sections 3.9.B.2.1 and 14.2.8.1.103, and FSAR Question Q210.47.

a. Review of Thermal Expansion Test Procedures

The inspector examined preoperational test procedure number 1-300-08, Thermal Expansion Testing. This procedure covers testing of safety-related piping systems whose normal operating temperature exceeds 250°F to verify thermal movements are within design limits. This test was also used to obtain data to size shims required for primary equipment supports. The inspector verified that test prerequisites were specified, test instructions and objectives were clearly stated, and acceptance criteria were specified. The test acceptance criteria requires that snubber movement be within design limits, that spring supports remain within the scale travel range, that measured thermal displacements of piping be within tolerances, and that piping and components not contact any interferences which may restrict piping thermal expansion.

b. Observation of Thermal Expansion Test

The inspector walked down portions of the reactor coolant, safety injection, steam generator blowdown, and main steam systems. During the walkdown, the reactor coolant system was operating at the 557°F temperature plateau. The inspector verified that temporary hangers had been removed, and that temporary scaffolding and ladders and permanent plant equipment (HVAC ducts, cable tray supports, structural steel supports, etc.) was not restricting piping thermal movement. The inspector examined spring cans and snubbers, and verified that they were operating within their design limits.

c. Review of Test Results

During the walkdown inspections discussed above, the inspector recorded snubber scale reading and compared these measurements to those recorded by licensee personnel on the test data sheets for the following snubbers on the reactor coolant (pressurizer spray) system: V1-1201-030-H026 though H028, H031, H035, H037, H039, H042 and H044 (this data was obtained after all interferences and problems had been resolved).

The inspector made a cursory review of piping thermal expansion test data for various systems obtained at reactor coolant system temperature plateaus of ambient, 250°F, 340°F, 450°F and 557°F. The inspector also reviewed the thermal expansion test problem sheets, the test log, and pretest walkdown inspection sheets.

Within the areas inspected, no deviations or violations were identified.

7. Piping Vibration Testing (70370)

The inspector reviewed piping vibration test procedures. Acceptance criteria utilized by the inspector appear in FSAR Sections 3.9.B.2.1 and 14.2.8.1.104 and FSAR Questions Q210,40 and Q210.41. The inspector examined the following procedures:

a. Preoperational test procedure number 1-300-09, Power Conversion and Emergency Core Cooling System Dynamic Test

b. Preoperative test procedure number 1-300-11, Steady State Vibration Monitoring of Safety-Related Piping

These procedures provide instructions for verifying the acceptability of the response of piping to steady state and transient vibrations. During review of the above procedures, the inspector verified that test prerequisites and acceptance criteria were specified and that test instructions and objectives were clearly stated.

The inspector also accompanied licensee inspectors and engineers on a pretest walkdown inspection of a portion of the safety injection system in the auxiliary building prior to performance of the steady state vibration test. Piping inspected is shown on Drawing numbers 1K3-1204-057-01 and 1K3-1204-057-01. During the walkdown inspection, licensee personnel verified the general piping and hanger configuration was in accordance with details shown on design drawings, that all temporary supports had been removed, that insulation, if required, had been installed, and that piping was not restrained by any temporary scaffolding and ladders and permanent plant equipment (HVAC ducts, cable tray supports, etc.) which would effect vibration test results.

Within the areas inspected, no violations or deviations were identified.

8. Containment Structural Integrity Test - Unit 1 (63050)

The inspector examined the Unit 1 containment building Structural Integrity Test (SIT), observed portions of the SIT, and reviewed test data. Acceptance criteria utilized by the inspector appear in Final Safety Analysis Report (FSAR) Sections 1.9.18, 3.8.1.7.1 and 14.2.8.1.100 and Regulatory Guide 1.18.

a. Review of SIT Procedures

The inspector examined preoperational test procedure 1-300-05, Containment Structural Integrity Test. This procedure specified type, location, and accuracy of instrumentation, test prerequisites, the test method, test pressure (1.15 times design pressure per R.G. 1.18, (1.15)(52) = 60.2 psig), measurement of concrete deflections (including mapping of crack patterns), and analysis of test data.

b. Witnessing of SIT

Prior to start of pressurization, the inspector toured the interior of the containment building and verified that required instrumentation was installed at specified locations.

The crack pattern map areas and several other locations on the exterior of the containment structure were also examined prior to start of the test. Interviews were conducted with several members of the SIT crew. The crew was knowledgeable of the test program and procedures, and the care and operation of the test instrumentation. Initial strains and deflections were recorded. Data output from the instrumentation was recorded and processed on a computer which printed and plotted the results.

The inspector witnessed approximately 18 hours of the SIT from start of pressurization, to maximum test pressure of 60.2 psig, and depressurization to 0.2 psig. Crack patterns were mapped prior to pressurization, at the maximum test pressure and after depressurization. The inspector observed mapping of cracks at several locations while at maximum test pressure and after depressurization. No measurable cracks were found during the SIT. Radial and vertical deflections were recorded at required locations and intervals. Test pressures were held at the specified increments for the required time periods.

Bechtel structural engineers and licensee test engineers continuously monitored the performance of the containment structure during the SIT. Test data were continuously reviewed to verify that measured deflections were within predicted values. One problem noted was an anomaly which occurred during the one hour holding period at a containment pressure of 45.0 psig with the data collected from the extensometers installed above the springline at elevation 340 feet to measure horizontal deflections of the containment dome. The inspector accompanied licensee and Bechtel engineers on a walkdown inspection of the interior of the containment structure when it was depressurized to 2.0 psig. This inspection disclosed that attachment of extensometer R32D/R35D, installed at elevation 340 feet at an azimuth of 150°, became detached from the containment liner during the test. When this occurred the extensometer dropped from the liner plate. The wire attached to this instrument became suspended on the invar wires attached to the other extensometers installed at elevation 340 feet, thus affecting readings from the other instruments. However, review of the data disclosed that it could be adjusted to account for the effect of the weight of the extensometer on the data gathered form the remaining instruments. The loss of this one extensometer did not affect the test since several extra instruments had been installed at various locations in the containment structure in anticipation of

possible failure of some instruments. Two other extensometers (numbers V-2 and V-3) also failed during the SIT. These instruments were for the measurement of vertical deflection of the containment structure at the springline. However, several other instruments had been installed to measure the vertical deflection at this point. Thus, test results were not affected by failure of extensometers V-2 and V-3.

c. Review of SIT Records

The inspector examined the following records relating to the SIT.

(1) Deflection data collected at various pressures during pressurization and depressurization of the containment structure

(2) The test log and the official signed-off copy of the SIT procedure

(3) Crack pattern mappings

(4) Records of as-built (installed) extensometer locations

(5) Records of malfunctioning extensometers

(6) Containment temperature and pressure data

Within the areas inspected, no violations or deviations were identified.

9. Previously Identified Inspector Followup Item (92701)

(Closed) Inspector Followup Item (IFI) 424, 425/85-17-02, Audit CP01-85/33 Followup. Georgia Power QA Audit CP01-85/33 identified weaknesses or omissions in the USL QA program in the areas of receipt inspection, QC procedures, and document control. These problems were identified as audit findings. The inspector reviewed the corrective action to resolve the audit findings. This review disclosed that seven additional procedures were written and implemented to correct this problem.

The inspector reviewed these procedures and verified that the weaknesses or omissions identified in the USL QA program had been corrected. Procedures reviewed were as follows:

PT-01, VSL Field Procedure Development and Control
PT-02, Control of Measuring and Test Equipment
PT-03, Review and Control of Quality Assurance Documentation
PT-04, Document Control
PT-05, Receipt, Receipt Inspection, Storage and Handling
PT-06, Nonconformance Control
PT-07, Qualification, Certification, and Training Requirement of VSL Post-Tensioning Inspectors

Based on review of the above procedures, and results of inspections of installation of the post-tensioning system conducted by a Region II inspector, it was concluded that the corrective action taken to resolve the audit finding was effective. Inspector Followup Item 424, 425/85-17-02 is closed.

10. Employee Concerns, Discussions, and Findings

a. Concern

On May 24, 1986, two individuals (herein after referred to as allegers) who were formerly employed at the Vogtle site participated in a press conference held in Savannah, Georgia. The May 25, 1986 edition of the Savannah Morning News reported that during the press conference one of the allegers stated that "the Unit 1 containment dome was not safe because it was riddled with air pockets and trash." NRC Region II contacted this alleger via registered mail and requested more information, but the alleger did not respond to provide any additional information regarding this concern. The Atlanta Southline newspaper reported in its July 9, 1986 edition that this same alleger stated that after NRC heard complaints that Vogtle Unit 1 containment had air bubbles in its concrete, NRC inspected the site and ordered Georgia Power to redo a portion of the work. The alleger stated that the problem was never properly corrected.

b. Discussion

After the article regarding the dome concrete appeared in the newspaper, the licensee evaluated the statement as a Quality Concern. The inspector reviewed Quality Concern 86 Vogtle which addressed this problem. In review of the problem, the licensee identified four deficiency reports (DRs) which had been written to address problems similar to the one mentioned by the alleger. These were as follows:

(1) DR CD1087 - Placement of 1/8 of a cubic yard of 2000 psi concrete in tenden gallery access shaft. Concrete was removed. QC inspectors received training to assure that this problem would not reoccur in the future.

(2) DR CD2206 - Cold joint in containment wall at elevation 312 feet. A detailed engineering investigation was performed and the cold joint was prepared in accordance with methods specified in Bechtel Specification X2AP01, Concrete.

(3) DR CD4546 - Void in Cadwelds (Rebar splicer). This problem was the result of a QC inspector incorrectly measuring the Cadweld voids. An extensive engineering investigation, which included tensile testing of Cadwelds, showed that the inplace Cadwelds were acceptable. No problem existed. QC inspectors were retrained to assure they were using current inspection methods.

(4) DR CD7117 - Void in containment wall east of Buttress 2 at elevation 316 feet. This problem was identified by licensee QC inspectors during post-placement inspection of the concrete. The void was repaired in accordance with methods contained in Specification X2AP01.

In addition to the four DRs listed above, the licensee also conducted an investigation of a possible void behind the containment liner plate in 1980. This problem was reported to NRC, Region II by the licensee. The results of this investigation, as well as the disposition of the four DRs listed above, were previously reviewed by NRC Region II inspectors. The inspector re-reviewed the four DRs during this inspection. Only one of the DRs (CD7117) concerned the dome area. This review disclosed the problems were not generic and were properly corrected. Based on the evaluation of this quality concern, the licensee concluded that the dome was properly constructed, that the allegation was unfounded, and that the dome was capable of performing its design function. A summary of the licensee's investigation and conclusions was submitted to NRC, Region II in a July 29, 1986 letter, Subject: Vogtle Units 1 and 2, Concerns Expressed by a Former Employee at Vogtle.

Numerous inspections of concrete placement operations have been conducted by Region II inspectors at the Vogtle site since placement of concrete in Category I structures commenced. During these inspections, the NRC inspectors verified that pre-placement inspection had been conducted to assure that placements were free of debris and trash, and the post-placement inspections were conducted to identify and repair areas with defects or voids (honeycomb) in completed concrete placements. The requirements for preplacement and post-placement inspections of concrete are stated in Georgia Power Procedure CD-T-02, Concrete Quality Control. The methods to repair concrete defects are stated in Bechtel Specification X2AP01, Forming, Placing, Finishing and Curing Concrete. Procedure CD-T-02 and Specification X2AP01 have been extensively reviewed by NRC inspectors during previous inspections. While some violations of NRC requirements were identified by the NRC inspectors during these inspections, the violations were corrected by the licensee, and the violations did not affect the final quality of integrity of the finished concrete structures.

Some voids and defects are expected in concrete placements. For this reason, project specifications contain requirements to inspect finish concrete placement to identify the defects, and contain requirements for repair of the defects. This is standard practice on all large projects which involving concrete placements.

Based on the previous inspections and detailed reviews conducted by NRC Region II of Readiness Review Module 1, Reinforced Concrete Structures, the inspector concluded that the licensee's program for placement of

concrete compiled with or exceeded NRC requirements and industry standards. No problems with voids or trash in the containment concrete were identified by NRC inspectors during these inspections. NRC has never ordered Georgia Power to redo a portion of the work in the concrete within the containment building or any other structure at the Vogtle site. Review of NRC inspection records disclosed that an allegation was made in late 1984 pertaining to a possible void in the containment wall concrete. This allegation is discussed in NRC Inspection Report 50-424/85-04 and 50-424/85-04 and concerned a possible void behind the liner plate discussed above which was reported to NRC Region II in 1980. In addition, the alleger reported the problem which was dispositioned by DR CD7117 (excessive voids in dome Cadwelds) in statements made during interviews with NRC investigators in early 1985. This allegation is discussed in NRC Inspection Report Nos. 50-424/86-53 and 50-424/86-24. However, the alleger did not express any concerns pertaining to voids or trash in the dome concrete at that time.

During the structural integrity test, the inspector examined portions of the dome and containment wall when the containment was pressurized to 1.15 times design pressure (60.2 psig). No defects were found in the concrete. Following completion of the SIT, an integrated leak rate test (ILRT) was performed on the containment structure in accordance with requirements of 10 CFR 50, Appendix J. The measured leakage was well below limits permitted by Appendix J. The performance of the containment structure during the SIT and the ILRT clearly demonstrate the structural integrity of the containment structure.

Conclusions

The allegation was not substantiated.

Within the areas inspected, no violations or deviations were identified.