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

Report Nos.: 50-424/85-15 and 50-425/85-15

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: April 15 - 19, 1985

Inspector: _____ 5-9-85
J. R. Harris Date Signed

Approved by: _____ 5-9-85
T. E. Conlon, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This special unannounced inspection involved 38 inspector-hours on site in the areas of Module One, Reinforced Concrete Structures, of the Readiness Review Program.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*D. O. Foster, Vice President, Project General Manager
*H. H. Gregory, General Manager, Construction Department
*E. D. Groover, Quality Assurance (QA) Site Manager
*M. H. Googe, Project Construction Manager
*B. C. Hardin, Manager Quality Control
*D. M. Fiquett, Unit 2 Field Manager
*F. Page, Quality Control (QC) Section Supervisor
*S. D. Holtom, QA Engineer Support Supervisor
*A. H. Lankford, QC Section Supervisor
*T. L. Weatherspoon, Assistant Manager QC
D. Ennis, Assistant Civil Engineer Manager
W. Davis, Civil Engineer
J. Seagraves, Civil Engineer

Other licensee employees contacted included three engineers and six technicians.

Other Organizations

*D. L. Kinnsch, Project Engineer, Bechtel Power Corporation
*S. Pietrzyic, Assistant Project Engineer, Bechtel Power Corporation
*D. W. Strohman, Project Quality Assurance Manager, Bechtel Power Corporation

NRC Resident Inspectors

*J. Rogge
*R. J. Schepens

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on April 19, 1985, 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

This subject was not addressed in the inspection.

4. Unresolved Items

Unresolved items were not identified during the inspection.

5. Readiness Review, Module 1, Reinforced Concrete Structures

The inspector interfaced with an NRC inspection group from the Office of Inspection and Enforcement, Washington D.C., that was evaluating the design program verification presented in Section 6.1 and the independent design review presented in Section 7 of Readiness Review Module 1. The inspector also performed a detailed review of Section 7, and examined resolution of observations 11 to 13 presented in Section 7.5.2. Observations are identified in Section 7 of the Readiness Review as items for which a determination of technical adequacy required a review of additional documents or items determined to be adequate, but require further documentation clarification. Observations examined by the inspector are as follows:

a. Observation Number 11, Inspection of Cadwelds

The independent design reviewer indicated that the inspection portion of Section 3.5 of Specification X2AP01, Mechanical Splicing of Reinforcing Bars neglected to address the centering of the splice sleeve on the bar ends and size of gap between the bar ends. These inspection requirements are required by Regulatory Guide 1.10 and referenced ERICO Catalog No. RBM-274. The reviewer indicated this item was resolved during his examination of Procedure CD-T-06, which showed that inspections included verification of the proper location of the splice sleeve and size of gap.

This inspector examined Section 3.5 of Specification X2AP01, Procedure CD-T-06, Regulatory Guide 1.10, the ERICO Catalog and discussed Cadweld training with responsible engineers and technicians. Examination of Paragraph C 3.5.7 in Section C3.5 of Specification X2AP01 showed that requirements for location of the splice sleeve and size of gap are addressed in the specification. Examination of Procedure CD-T-06 showed that details for centering of the splice sleeve were given. Details on size of gap between ends was not given; however, procedure CD-T-06 does state that installation shall be in accordance with the ERICO Catalog which gives specifics on size of gap between bar ends. Discussions with responsible engineers and technicians indicated that the ERICO Catalog was part of the training for Cadweld inspectors.

b. Observation Number 12, Material Specification Review

The independent design reviewer indicated that the material specification omitted details of mix design regarding air entrainment, mix proportions and control of water for slump adjustments. This was resolved by the reviewer when subsequent review and discussions showed that mix designs are controlled by an independent laboratory and that control of mixes was being controlled in accordance with Procedure CD-T-02, Concrete Quality Control.

This inspector examined Section 3.6 of Specification X2AP01, Procedure CD-T-02, and mix design reports from January 1980 through November 1983. Examination of Section C3.6 of the specification showed that details for mix design regarding admixtures, mix proportions and control of water for slump are addressed in Specification X2AP01. Review of mix design reports showed that mix designs are being reviewed and controlled. Examination of Procedure CD-T-02 showed that adequate instructions for production and placement of concrete are provided for inspectors.

c. Observation Number 13, Material Specification Does Not Meet Licensing Commitments

The independent reviewer stated that his initial review of the material specification indicated that the material specification did not appear to meet the letter of licensing commitments in a number of cases. These cases are as follows:

(1) Paragraph C3.1.5.D.4 of Specification X2AP01 permits concrete greater than three feet in the least dimension to have a maximum placing temperature of 80°F. This appears to be contrary to Regulatory Guide 1.55 and ACI 305-72 (Hot Weather Concreting) which suggest that for massive-type structures, a temperature of 60°F or even lower would be desirable. Subsequent examination of specification X2AP01 by the independent reviewer showed that the specification requires that the concrete temperature be as close to 50°F as possible. The 80°F is the maximum allowable when all methods possible to reduce concrete temperature have been employed. Based on the additional information found by the reviewer in the specification, it was concluded that the specification and site practice meet the intent of ACI 305-72.

The inspector examined Regulatory Guide 1.55, ACI 305-72, Section 3.1 of Specification X2AP01, and Chapter 10, Hot Weather Concreting, of the Portland Cement Association Engineering Bulletin, Design and Control of Concrete Mixtures. Paragraph 2.2.1 of ACI 305-72, Hot Weather Concreting, states that for the more massive structures whose dimensions are such that significant heat is generated through hydration of cement, a temperature of 60°F or lower would be desirable. The Portland Concrete Engineering Bulletin states that a temperature of 50°F to 60°F is desirable, but sometimes impractical, and that 90° is a reasonable and practical upper limit. Examination of Section 3.1.5 of Specification X2AP01 showed that the specification requires for hot weather conditions that the concrete in members three feet or more in the least dimension have a maximum temperature of 80°F, but as near 50°F as can be obtained using the cooling method listed in Paragraph C3.1.5.0.2, of the specification.

(2) ACI 318-71 is a licensing commitment, but is not included as one of the quality standards in Paragraph C3.2.2.B of Specification X2AP01. ACI 318-71, Part 3, Construction Requirements, has chapters on concrete quality, mixing and placing concrete, form work, embedded pipe and construction joints and details of reinforcement. Subsequent inspection of this item by the independent design reviewer disclosed that ACI 318-71 was not listed as a quality standard since no reference to the code was used and that the intent of ACI 318-71 was incorporated into the detailed requirements of the specification.

The inspector examined licensing commitments listed in the Final Safety Analysis Report (FSAR) Section 3.8, Design Concrete; Specification X2AP01, Section C3.2, Forming Placing, Finishing and Curing of Concrete; ACI 318-71, Part 3, Construction Requirements; and, ACI-304-73, Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete. The inspector also reviewed ACI 347-68, Recommended Practice for Concrete, and ACI 309-72, Recommended Practice for Consolidation.

Examination of FSAR commitments showed that Paragraph 3.8.1.6.1 states that structural concrete is batched and placed in accordance with ACI 304, Recommended Practice of Mixing, Transportation and Placing Concrete and ACI 318-7, Building Code Requirements for Reinformed Concrete. Examination of Section C3.2 of Specification X2AP01 showed that this portion of the specification covers forming, placing, finishing and curing of concrete. Quality standards listed in this section are ACI 304-73, Recommended Practice for Measuring Mixing and Placing Concrete; ACI 309-72, Recommended Practice for Pouring Concrete; and ACI 347-68, Recommended Practice for Concrete Form Work. Review of these quality standards showed that they contain the more detailed information than ACI 318-71 on forming, placing, finishing and curing of concrete. Examination of Specification X2AP01, Section C3 showed that the pertinent requirements in the referenced standards and ACI 318 have been incorporated in the specification.

(3) Form work tolerances specified in Paragraph C3.2.5.B of Specification X2AP01 exceed the tolerances of ACI 347-68 which is listed as an FSAR commitment. Subsequent review of this item by the independent design reviewer disclosed that ACI 347-68 allows the designer to specify tolerances in lieu of using the suggested values.

The inspector examined Section C3.2.5.B of Specification X2AP01 and ACI 347-68. Examination of Paragraph 2.4 of ACI-347-68 confirmed that the specified tolerances listed in ACI 347-68 suggested tolerances for structures where tolerances are not stated in specifications or drawings. Tolerances being used in the specification are those specified by Bechtel who is the designer.

(4) Paragraph C3.2.5F of Specification X2AP01 allows significant discretion to Georgia Power Company (GPC) field engineering to add or delete construction joints. This is contrary to the intent of Regulatory Guide 1.55, which states that the designers should control the location of construction joints. This item was resolved by the independent design reviewer when a followup review disclosed that relocation of construction joints are controlled by Field Change Requests (FCRs) which receive engineering review.

The inspector examined Regulatory Guide 1.55, Paragraph C3.2.5, of Specification X2AP01, and Part C, Engineering, Section 17, Field Change Requests of the Vogtle Electric Generating Plant Reference Manual. Examination of Regulatory Guide 1.55 showed that the Regulatory Guide does require the designer to check the design and shop drawings for practicality of location of construction joints.

Examination of Part C of the Engineering Reference Manual showed that review of FCRs by design engineers is a site requirement. Discussions with site engineers indicated that FCRs are being used to approve relocated construction joints.

(5) Paragraph C3.2.5.G of Specification X2AP01 allows a small amount of ice and snow to exist on items to be embedded. This is not in compliance with ACI 318-71. This item was resolved by the independent design reviewer when further review of Specification X2AP01 and Procedure CD-T-02 showed that ice and snow in contact with embedded items or concrete is prohibited.

The inspector reviewed Paragraphs C3.2.5.G, C3.2.5.J.3 and C3.4.6.A.1 of Specification X2AP01 and Procedure CD-T-02, Concrete Quality Control. Examination of these documents confirmed that a small amount of snow on embedded items in concrete is allowed by Paragraph C3.2.5.G of Specification X2AP01 and is prohibited by Paragraphs C3.2.5.J.3 and C3.4.6.A.1 of Specification X2AP01 and Procedure CD-T-01. Guidance in Procedure CD-T-02 and Paragraphs C3.2.5.J.3 and C3.4.6.A.1 is more restrictive and thus supercedes Paragraph C3.2.5.G. Guidance for Quality Control (QC) inspectors who inspect for this item is provided by Procedure CD-T-02 which prohibits any snow or ice on concrete embedments.

(6) Paragraph C3.5.6.C does not stipulate that an independent laboratory analysis is required to identify the cause of all tensile test failure when specific failure rates are exceeded. Such analysis is require by Regulatory Guide 1.10.

This item was resolved by the independent design reviewer when further investigation of Specification X2AP01, Section C3.5, Mechanical Splicing of Reinforcing Bars, showed that the specification requires Bechtel engineering to review Cadweld test data. Bechtel is not involved in Cadweld production and is thus considered an independent laboratory.

The inspector examined Regulatory Guide 1.10 and Specification X2AP01, Section 3.5, and discussed Cadweld controls with responsible inspectors and engineers. Examination of these documents and discussions with inspectors and engineers confirmed that Bechtel Engineering is not involved in Cadweld production and is considered an independent laboratory for review of Caldweld tensile test failures.

(7) Paragraph C3.5.7.6 of Specification X2AP01 requires splicer requalification when the failure rate for Cadweld tensile tests exceeds one in 15 consecutive tests. Procedure CD-T-06 requires requalification only if two consecutive tests fail to attain 125 percent of yield.

This item was resolved by the independent reviewer through review of Cadweld tensile test data and by requesting Procedure CD-T-02 be revised to clarify splicer requalification requirements. Examination of Cadweld test data by the reviewer showed only one splicer with two tensile test failures in 15 consecutive samples during the life of the project. A stop work order was initiated and the splicer was recertified.

The inspector examined Section 3.5 of Specification X2AP01, requirements in Regulatory Guide 1.10, Procedure CD-T-06 and the Evaluation Log for Cadweld Tensile Testing. Examination of Procedure CD-T-06 confirmed that the procedure has been revised to clarify splicer requalification requirements. Examination of Cadweld test data showed that there has only been two cases where the tensile test failures exceeded one failure for each 15 consecutive tensile tests. Review of documentation showed that these deficiencies were identified by the licensee and that stop work notices were issued to halt production until the items were properly addressed.

(8) The FSAR references ASTM C-33 as the criterion for aggregate fineness and has the additional requirements of fineness modulus between 2.5 and 3.0. The specification incorporates the ASTM C-33 requirements of a fineness modulus between 2.3 and 3.1.

This item was resolved by the independent reviewer when further examination of Specification X2AE02 disclosed that the specification require the average fineness modulus on any five successive samples to be between 2.5 and 3.0.

The inspector examined Paragraph 3.8.1.6.1.B of the FSAR, ASTM C33, Specification X2AE02 and Chapter 4 of the Portland Concrete Association Engineering Bulletin, Design and Control of Concrete Mixtures. Examination of the FSAR confirmed that fine aggregates are required to conform to ASTM C-33 and also a

fineness modulus of not less than 2.5 nor more than 3.0 during normal operations. Examination of ASTM C-33 and the Portland Concrete Association Engineering Bulletin showed that these documents state that the fineness modulus shall be not less than 2.3 nor more than 3.1. Examination of X2AE02 confirmed that the specification allows, a slightly wider range on individual samples than required by the FSAR. However, the specification also requires the average modulus on any five successive samples to be between 2.5 and 3.0. Review of these documents confirmed that the requirements for fineness modulus meet or exceed industry practices.

Within the areas examined no violations or deviations were identified.

d. Conclusion

Based on the review discussed above, the inspector concluded that the problems discussed in observations 11 to 13 of Section 7.5.2 of the Readiness Review Program have been adequately addressed by the licensee. These observations did not affect the structural integrity of any safety-related structures on site, nor did they compromise the licensee QC inspection or Quality Assurance program.