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

Report Nos.: 50-424/86-53 and 50-425/86-24

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 14-18, May 5-9, and May 21-23, 1986

Inspector: J. R. Harris for 7-16-86
J. J. Lenahan Date Signed

Accompanying Personnel: J. R. Harris (May 5-9, 1986)

Approved by: T. E. Conlon 7-16-86
T. E. Conlon, Section Chief Date Signed
Engineering Branch
Division of Reactor Safety

SUMMARY

Scope: This special announced inspection involved the areas of review of reactor building post-tensioning QA/QC controls, work activities, and quality records, review of readiness review module 13C; Post-Tensioned Containment, review of licensee identified items, review of the thermal expansion program, follow-up on IEN 85-10, and followup on employee concerns in surveying and concrete construction operations.

Results: No violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*D. O. Foster, Vice President, Project Manager
*P. D. Rice, Vice-President, Engineering
*E. D. Groover, Vogtle Quality Assurance Manager
*B. C. Harbin, Construction QC Manager
*G. A. McCarley, Project Compliance Coordinator
N. Brooks, Civil Engineering Section Supervisor
D. Innes, Assistant Supervisor, Civil Engineering Section
*R. W. McManus, Readiness Review Team Leader
D. Peacock, Civil Engineer
**Nelson Lankford, Civil QC Section Supervisor

Other licensee employees contacted included civil engineers, civil QC inspectors, and survey personnel.

Other Organizations

D. D. Wieland, Site Manager, Westinghouse
W. Cretsizer, Mechanical Engineer, NISCO

NRC Resident Inspectors

**H. Livermore
J. Rogge
***R. J. Shepens

*Attended exit interview, April 18, May 9, and May 23, 1986
**Attended exit interview, April 18 and May 9.
***Attended exit interview May 23.

2. Exit Interview

The inspection scope and findings were summarized on April 18, May 9, and May 23, 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. One new item was identified during the inspection:

Inspector Followup Item 424/86-53-01, Stressing Ram Calibration and Conversion Accuracy, paragraph 8.

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. Independent Inspection Effort

a. The inspector examined Bechtel Specification X7BH14-01, Specification for Piping Vibration, Thermal Expansion, and Dynamic Effects of ASME Section III, Nuclear Class 1, 2, and 3 and ANSI B31.1 Piping.

b. The inspector examined Georgia Power Procedure Number 28310-C, Functional Testing of Mechanical and Hydraulic Snubbers.

6. Containment (Post-Tensioning) - Review of Quality Assurance Implementing Procedures (47051)

The inspector examined the procedures listed below which controlled installation of the reactor building containment post-tensioning system. Acceptance criteria utilized by the inspector appear in FSAR Section 3.8.1. Procedures examined were as follows:

a. Bechtel Specification X2AF04, Containment Post-Tensioning System

b. VSL Field Instruction Manual for Installation of VSL E5-55 Post-Tensioning System

c. Bechtel Drawing Numbers 1X2D01K001 through 1X2D01K008, Containment Prestressing Requirements

d. VSL Drawings Numbers PT 1-8, Anchorage Details PT 32.1-5, Vertical Tendon Stressing Data, PT 32.2-4, Horizontal Tendon Stressing Data, and PT 31.3-3, Horizontal Tendon Stressing Data.

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

7. Containment (Post-Tensioning) Observation of Work Activities (47053)

The inspector observed installation of vertical tendon number 46-140. Acceptance criteria utilized by the inspector are those procedures listed in paragraph 6, above. Prior to tendon installation, the tendon sheathing was cleaned with a wire cleaning brush and dry mop which were pulled through the sheathing in accordance with the requirements of the Bechtel Specification and VSL Field Installation Manual. The inspector toured the tendon gallery and verified that exposed tendon tails were wrapped with visquin to protect the tendons prior to stressing, cutoff, and greasing.

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

8. Containment (Post-Tensioning) - Review of Quality Records (47055)

The inspector examined quality records relating to installation of the post-tensioning system. Acceptance criteria utilized by the inspector are those procedures listed in paragraph 6. Records examined were as follows:

a. Tendon installation reports, tendon stressing reports, tendon greasing reports, and quality control checklist for vertical tendon numbers 14-98, 16-96, 18-94, 20-92, 22-90, 24-88, 7-105, 9-103, 11-101, 13-99, 27-85, 29-83, 31-81, and 33-78 and horizontal tendon numbers 7, 113, 114, 118, through 120, 130 through 140, and 151 through 155.

b. VSL Deviation Reports numbers VF-1 through VF-90

c. Training and Qualification Records for 8 VSL Level I, 3 VSL Level II and 1 VSL Level III QC Inspectors

d. Calibration records for VSL stressing ram numbers 6529, 6550, 1000-12-1, 1000-12-2, 1000-12-5, and 1000-12-8

e. Georgia Power QA Audit Numbers CD01-85/33, CD08-84/52, CD08-84/83, CP15-85/26, CP15-85/82 and CP15-86/10

Review of the stressing reports and stressing ram calibration records disclosed the following concerns:

Calibration of the stressing rams is required to be performed annually. The rams were calibrated prior to start of stressing activities in 1985 and were required to be recalibrated in 1986. Recalibration of three rams (ID numbers 6529, 6530, and 1000-12-2) was performed in January 1986. The remaining rams will be recalibrated prior to start of stressing of the Unit 2 tendons. However, the inspector noted that the most recent calibration results were not compared with previous calibration results to determine if significant changes had occurred in the calibration data. The primary concern with comparing the results is to verify that calibration data used to compute previous lift-off (tendon stress) values was accurate. A significant change in ram calibration results may invalidate previously computed lift-off data. This problem has occurred on other sites. Thus, it is necessary to compare current calibration data for stressing rams with previous calibration data to preclude problems. The tendon lift-off data is computed from hydraulic fluid pressure values recorded in the stressing ram during stressing. The pressure value is converted to tendon prestress force in pounds by applying conversion factors obtained during ram calibration. Discussions with Georgia Power QC inspectors disclosed that the tendon prestress values are calculated by VSL inspectors and that these calculations are not checked by Georgia Power personnel. The inspector expressed concern to licensee management personnel regarding the need to check the VSL calculations for

accuracy. This problem regarding checking of ram calibration data and tendon lift-off force measurements was identified to the licensee as Inspector Follow-up Item 424/86-53-01, Stressing Ram Calibration and Conversion Accuracy.

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

9. Readiness Review, Module 13c, Post-Tensioned Containment

The inspector performed a detailed review of Sections 3.0, 5.0, and 6.0 of Module 13c as part of a continuing assessment of the effectiveness of the licensee's verification program for post-tensioning of the containment structure. This verification program is being conducted by the licensee to assure that design, construction, and operational requirements and commitments have been properly implemented. In addition to reviewing the details presented in these sections of the module, the inspector verified that the correct FSAR commitments were referenced, randomly sampled the commitments and verified that the commitments were being implemented in the specifications and procedures, examined findings identified by the licensee to verify that the resolutions were accurate and examined records documenting results of the construction inspection program. Results of the inspector's review are discussed in the following paragraphs.

a. Module 13c, Section 3 Commitments

This section of the module has a commitment matrix which contains a listing of the source and subject of licensee commitments and an implementation matrix with a listing of the commitments and corresponding implementing documents.

The inspector reviewed the FSAR and verified that the commitments referenced in the FSAR have been identified in the commitment matrix. The inspector also reviewed the implementation matrix to verify that construction commitments have been correctly implemented in construction specifications and procedures. This review disclosed that the commitments were being properly implemented in site specifications, drawings, and procedures.

b. Module 13c Section 5.0, Audits and Special Investigations

This section of the module contains a discussion of QA audits, NRC inspections, and special investigations conducted for the containment post-tensioning program. The QA audits covered design, fabrication, and installation of the post-tensioning system. The inspector reviewed the audits, examined the audit finding, and verified that the audit findings were properly resolved.

Six NRC inspections were performed which addressed the post tensioning system installation. No violations or deviations were identified. Investigation of post-tensioning design and construction problems are

summarized in Section 5.3 of the module. These investigations were performed to assure that previously identified problems would not impact the Vogtle project.

c. Module 13c Section 6.1, Design Program Verification

The design program verification was a systematic review of design documents, including design criteria, design drawings, design calculations, specifications, design change documents, and vendor supplied documentation to verify conformance to licensing commitments and design control quality program requirements. One finding was identified. This finding concerned failure of VSL to submit a design calculation to Bechtel for review in accordance with specification requirements.

The inspector examined selected commitments identified in the FSAR and verified that these commitments were included in design criteria. The inspector examined sections of the Bechtel Vogtle Project Design Manual and Bechtel Topical Reports and verified that commitments were implemented in these documents. Documents examined included:

- DC-1000-C, General Design Criteria Civil/Structural
- DC-2101, Containment Building
- Topical Report DC-TOP-5-A, R3, Prestressed Concrete Nuclear Reactor Containment Structures
- Topical Report BC-TOP-7, Full Scale Buttress Test
- Topical Report BC-TOP-8, Tendon End Anchor Reenforcement Test
- Procedures and Drawings listed in paragraph 6, above

The inspector examined the finding and corrective actions associated with resolution of the finding. The finding concerned the failure of VSL to submit one design calculation to Bechtel for review. However, VSL had submitted a sample calculation similar to the one in question in their proposal to furnish the post-tensioning system in accordance with specification X2AF04.

The purpose of this calculation was to demonstrate that the VSL post-tensioning system met the specification requirements. The calculation was not resubmitted after award of the contract and was not required by Bechtel to complete the containment design. In order to resolve this finding, VSL submitted the subject calculation which was reviewed and accepted by Bechtel on February 7, 1986. Further review of the calculation by the Readiness Review staff disclosed some minor inconsistencies in prestressing system material specified in the FSAR and specification X2AF04. This problem was also identified during the Independent Design Review (discussed in Section 7.0 of Module 13c) and

was identified as Readiness Review Finding 13c-6. The most significant inconsistency identified concerned the prestressing system anchor wedges. The FSAR and specification states that wedges will conform to AISI 86L20 whereas the wedges delivered to the job site were made of AISI 8620 steel. A deviation report (VSL Number VF-78) was written to document and disposition this problem. Review of the deviation report disclosed that VSL initially stated that wedges would be fabricated from AISI 86L20 material, but subsequently requested the use of an alternate material. This change was not reflected in the FSAR or specification. Review by the readiness review staff and Bechtel engineering staff disclosed that wedges used met project requirements and would not affect performance of the post-tensioning system. This finding is resolved.

d. Module 13c Section 6.2, Construction Programs Verification

The construction assessment program was divided into two parts: commitment implementation and construction assessment. Two findings were identified during construction assessment activities. The commitment implementation involved review of each construction commitment identified in the FSAR and generic letters applicable to Module 13c to verify that each was properly implemented in project construction documents.

The construction assessment consisted of an appraisal of VSL's installation, inspection, and programmatic activities. Installation of the post-tensioning system was approximately 16 percent complete when the construction assessment was conducted. The assessment involved review of programmatic activities such as inspector training, nonconformance report control, control of measuring and test equipment, and QA records. The assessment also involved walkdowns to observe work activities involved with installation of the post-tension system. The readiness review team observed cleaning of the tendon sheathing, installation, stressing and greasing of one tendon.

The inspector observed cleaning of the tendon sheathing and installation of vertical tendon number 46-140. The inspector also made a detailed review of selected quality records. Records reviewed are listed in paragraph 8, above. The inspector examined the two findings and corrective actions associated with resolution of the two findings. One finding concerned the fact that the VSL installation checklist did not document application of a coating of grease to the tendons as it entered the tendon sheathing. The application of this grease coating is required by the project specifications. This finding was resolved by generation of an FCR which amended the installation checklist to provide the required documentation. The purpose of coating of the tendons with grease as they enter the tendon voids is to reduce friction and facilitate tendon pulling. Application of this grease coating is not required for inhibiting corrosion. Corrosion protection is provided by thoroughly greasing the tendon strands during tendon fabrication, and pumping grease into the tendon voids after tendon

stressing. This finding had no safety significance. The other finding concerned failure of the contractor to protect the containment concrete surface from grease spillage/leakage during greasing operations as required by specification X2AF04. This finding was addressed in Deviation Report VF-56. Since the reason for this requirement was primarily to assist in cleanup of grease spills and was for cosmetic purposes only, the requirement was removed from the specification. However, the contractor was still responsible to clean up grease spills. This finding had no safety significance.

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

10. IE Information Notice 85-10, Tendon Anchorhead Failures

An evaluation of the Farley tendon anchorhead failures was performed by Bechtel. This evaluation is documented in Section 5.3 of Readiness Review Module 13c. Bechtel concluded, based on review of metallurgical test reports performed on the Farley anchorheads that similar type failures would not occur in Vogtle's post-tensioning system since the VSL anchorheads are fabricated from steel with strength, well below the high strength (150 KSI ultimate strength) steel used in the Farley anchorheads. The failure of the Farley anchorheads was attributed to hydrogen embrittlement of the high strength steel used in fabrication of the anchorheads. Hydrogen embrittlement does not occur in lower strength steels. The type steel used for the Vogtle anchorheads was A1S1 1026, with an average tensile strength of 65000 to 70000 psi.

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

11. License Identified Item (10 CFR 50.55(e))

Prior to this inspection the licensee identified the following item under 10 CFR 55.55(e):

(Closed) Item (CDR 84-54) Pacific Scientific PSA-1 and PSA3 Shock Arrestors - Capstan Spring Failure. This item was reported to NRC Region II on January 26, 1984. The licensee submitted an interim report for this item in a letter dated February 23, 1984, and a final report in a letter dated July 3, 1984. In September 1983, Pacific Scientific Company advised the licensee of failure of capstan spring tongs in four PSA-1 snubbers at the Callaway site. Subsequent review of this problem and testing by Pacific Scientific disclosed that the problem involved PSA-1 and PSA-3 snubber models with certain serial numbers. Laboratory testing disclosed that the spring failures were the result of stresses induced during spring fabrication. The result of the testing and a summary of the problem is discussed in Pacific Scientific Service Bulletin number SR 83-01. In order to resolve this problem, the licensee inspected all PSA model 1 and 3 snubbers in storage at the Vogtle site to identify those with potentially defective capstan springs. These snubbers were returned to PSA for capstan spring inspection and replacement, if necessary. In order to prevent

recurrence of this problem, PSA reviewed the capstan spring fabrication sequence to ensure complete removal of all cold forming stresses after the spring tongs are formed. This item is closed.

12. Employee Concerns, Discussions, and Findings

a. Background

Three individuals (herein after referred to as allegers), who were formerly employed at the Vogtle site have expressed several concerns related to civil construction activities. These allegations were expressed during interviews with NRC investigators, and in the case of two individuals, during interviews broadcast on nationally syndicated television programs. The inspector reviewed the concerns contained in the allegers' statements and examined construction drawings, specifications and procedures, construction records, and conducted interviews with licensee and licensee contractor employees. The concerns and the results of the inspection regarding these concerns is summarized below.

b. Concern

Prior to late 1982 or early 1983, there were no written procedures relative to how surveyors were to perform their work. Procedure SU-T-01, Survey Control was not written until late 1982 or early 1983 to control survey work.

Discussion

The inspector reviewed procedure SU-T-01. This review disclosed that procedure SU-T-01 was initially issued in July 1982. Prior to the issuance of procedure SU-T-01, desk top instructions were used to provide instructions for control of survey work. These procedures were reviewed by the inspector during an inspection conducted March 17-18, 1980, and results of the review is documented in NRC Inspection Report 50-424, 425/80-05. The desk top instructions were incorporated into Procedure SU-T-01. Procedure SU-T-01 was written in response to an INPO audit finding regarding adequacy of controls for desk top instructions. This finding was primarily concerned with control of revisions to the desk top instructions and not the technical adequacy of the procedures. Since the desk top procedures were not controlled documents, copies of the superseded procedures has not been retained in the licensee's document control system. The inspector examined copies of various superseded desk top procedures issued between 1979 and 1981 which covered calibration of survey equipment, control of surveys in the power block area and horizontal control that had been retained by survey personnel in their personal files. However, since the desk top procedures were not controlled documents, it is not possible to review all previously issued desk top procedures and verify that written procedures for control of survey work existed since start of construction activities at the Vogtle site. The inspector examined

procedure SU-T-01 and found it to be adequate for control of survey activities. The inspector also reviewed two current desk top procedures which provide additional amplification and direction for surveys in the powerblock area. These were desk top procedure numbers DT-C-11, Survey Control in the Powerblock, and desktop procedure number DT-C-16, First Order Class II Geodetic Leveling.

Findings

Written procedures had been in existence prior to 1982 for control of survey work activities. These procedures had been reviewed by the inspector in March 1980. However, since these procedures were not controlled in the Vogtle document control system, the inspector was not able to ascertain whether or not they had been in existence since start of construction at the site. However, even if written procedure had not existed, survey activities inherently require a high degree of precision and accuracy, and thus they are conducted in accordance with rigid industry standards, such as those specified by the U.S. Department of Commerce National Oceanic and Atmospheric Administration (NOAA). If high standards had not been achieved in performance of survey work at the Vogtle site, numerous problems would have been identified during construction of buildings and equipment installation, which would have been attributed to survey errors. Since no significant errors have been identified, it is reasonable to conclude that survey activities were conducted in accordance with rigidly controlled standards and that a high degree of precision and accuracy was achieved. The allegation was not substantiated.

c. Concern

Individuals who performed survey work at the Vogtle site in the 1970's may not have had necessary experience or proper equipment to establish survey controls for the Vogtle project.

Discussion

The inspector reviewed training records and resumes listing prior experience of survey personnel performing surveys during the 1970's. This review disclosed that many of the personnel who worked as surveyors at the Vogtle site in the 1970's had several years of prior survey experience prior to employment at the Vogtle site. In addition, the licensee's training program for survey personnel involved extensive class room and on-the-job training. In order to qualify as a Level I surveyor, an individual was required to have approximately one year of survey experience (on the job training) and six weeks of classroom training. Level II surveyors required an additional six weeks of training plus approximately one to three years of work experience as a Level I surveyor. The inspector discussed the licensee's training with licensee training personnel who had been involved in instructing the site survey personnel. The inspector also reviewed the training course material and written exams completed by several of the survey

personnel. This review disclosed that the licensee's training program was very comprehensive. The inspector also discussed surveying methods and equipment used for layout of survey controls at the site with licensee personnel. These discussions disclosed that the survey equipment and methodology used to establish survey controls at the Vogtle site was compatible or exceeded that used on other nuclear and commercial projects. The condition and quality of survey equipment used on the Vogtle project exceeded that used on any of the commercial and government projects the inspector had been previously involved with.

Findings

Individuals performing survey work at the Vogtle site in the early 1970's had experience and equipment necessary to establish survey controls for Vogtle site. This concern is not substantiated.

d. Concern

Procedures were not being followed regarding control of survey field books. Specific problems cited by the concern regarded not retaining field books, not entering results of all survey field work into field books, and not maintaining control of field books as required by procedure Number SU-T-01.

Discussion

A similar problem was expressed by an individual in Quality Concern number 85V0032. The inspector examined Procedure SU-T-01, Survey Control. Procedure SU-T-01 requires that a master index of all field books be established to keep track of the field books issued. Field books are required to be maintained in a fire-proof cabinet in the survey office and to be signed out daily by personnel removing the books from the office. Review of the master index of field books and discussions with survey personnel disclosed that the requirements of Procedure SU-T-01 regarding control of field books, is not being followed. The master index is not being maintained up-to-date and field books are not signed out prior to being removed from the survey office. Georgia Power, in response to the quality concern, stated that the procedure requirement concerning control of field books would be reviewed and modified if necessary, but regardless, procedure requirements would be adhered to. The inspector discussed the failure to follow Procedure SU-T-01 regarding control of field books with licensee management personnel. These individuals stated that the procedure would be reviewed again and modified if necessary, but that procedure would be adhered to. The licensee had no explanation as to why the procedure was not being followed. However, further review of the problem by the inspector showed that procedure requirements regarding control of field books were not NRC or Appendix B requirements, but rather self-imposed requirements. Discussions with licensee personnel disclosed that requirements in Procedure SU-T-01 for

control of field books were instituted by Georgia Power survey supervisory personnel to maintain traceability over field books which were out in the field. The main reason for doing this was to identify individuals who last had possession of a field book to assist in locating it if it became misplaced. Also, an individual who was responsible for loosing a field book could be subjected to disciplinary action. The identity of this individual could be determined from the sign out log. The loss of a field book would not have any safety significance since the survey work recorded in the field book could be redone if necessary. However, redoing the work would result in delays to construction and additional unnecessary survey work. Both of these would result in additional cost to the licensee, but would not have safety significance. The licensee stated that Procedure SU-T-01 will be revised to clarify the requirements regarding field book control.

The inspector discussed recording of survey data in survey field books with licensee survey personnel. These discussions disclosed that all data would not have been entered into field books. Examples of data not entered into the books were surveys for temporary structures, laydown areas, temporary benchmarks, etc. However, there are no requirements to enter this data into the field books and the fact that it wasn't has no safety significance. The inspector examined storage of field books in the permanent operations records storage vault and in the survey field office. There were approximately 900 to 1000 field books stored in the vault and in excess of 100 in the survey office. Based on the large number of field books stored as permanent plant records, it is obvious that field books have been retained, even though the majority of them do not constitute QA records requiring retention under NRC requirements.

Findings

This concern was found to be partially substantiated in that Procedure SU-T-01 was not being followed regarding the requirements concerning control of field books. However, these requirements were self-imposed by the licensee and were not NRC requirements. The failure to control the field books per SU-T-01 has no safety significance. The portion of the concern regarding not recording all survey data in the field books was also substantiated. However, this concern has no safety significance since data not recorded did not concern safety-related work. Examination of the field books in records storage disclosed that field books had been retained. However, the bulk of the data (more than 95 percent) recorded in the field books are not QA records requiring retention for the life of the plant.

e. Concern

In 1981, alleger stated that auxiliary building was found not to be level and was 3 inches off "design location". The individual stated that error was probably caused by another surveyor making an error in measuring in the auxiliary building from C level to the D level when

the surveyor "pulled" from "D" level to "C" level. The alleger stated that Procedure SU-T-01 did not permit survey crews to pull up between floors.

Discussion

From review of the alleger's statement, the inspector concluded that the alleger meant that 3 inches of differential settlement had occurred between opposite ends of the auxiliary building. This is most likely what the alleger means when terms "not level" and "3 inches off design location" are used in the allegers statement.

The expression pulled up between level C and level D refers to the method used to transfer floor elevations from one level to another. This was accomplished by use of a surveyor's 100' chain (i.e., a calibrated 100' tape measure). This method is not prohibited by Procedure SU-T-01, but in fact is specified in desk top procedure DT-C-16 as the method to use in transferring elevations from one level to another within a structure. The inspector reviewed auxiliary building settlement data. This review disclosed that differential settlement within the auxiliary building is approximately ¼ of an inch. From review of the alleger's statements another possible explanation of expression "3 inches off design location" is that survey loop did not close within required tolerance. The inspector discussed with licensee survey personnel action to be taken when survey level loops do not close within tolerance. These discussions disclosed that the work was repeated, that is, surveys were repeated until acceptable error of closures were obtained. The permissible error in first order Class II work is plus or minus 0.0042 feet (.05 inches) within the auxiliary building. This is an extremely accurate survey requirement. Licensee survey personnel stated there were numerous occasions when surveys had to be redone due to unacceptable closure errors.

Findings

The concern was not substantiated. Survey procedures were not violated in transferring elevations from one level (floor) to another within a structure. The amount of differential settlement which has occurred within the auxiliary building is approximately ¼ inch not 3 inches. This is well within acceptable limits.

f. Concern

Permanent survey control markers were destroyed during construction

Discussion

Licensee survey personnel installed numerous survey control monuments on the east, west, north, and south sides of the power block excavation. These monuments, which were generally located on building column lines, were used to layout the permanent structures. Discussion

with licensee survey personnel disclosed that several monuments were either disturbed or destroyed during construction. This occurs on all construction projects. When this occurred, the monument was reinstalled at the proper location using the same control points used to install the original monuments or other undisturbed monuments. Also, as construction progressed some monuments were removed since they were no longer needed. The fact that monuments were disturbed or destroyed during construction has no safety significance. When this occurred, they were relocated if necessary.

Findings

This concern is substantiated. However, it has no safety significance. On any construction project, destruction of survey monuments is a fact of life which survey personnel deal with. Relocating survey monuments results in construction delays and increased project costs. Safety is not affected.

g. Concern

In early 1984, alleger stated that he saw three different grade marks which indicated a difference of at least 1½ inches between elevation 200 in the control building, turbine building, and containment structures. Alleger is concerned that these elevation discrepancies could affect piping design.

Discussion

The inspector walked down the Unit 1 main steam tunnel. The floor in the steam tunnel is approximately elevation 202. During the walkdown, the inspector noted several horizontal and vertical survey control marks scribed on the walls of the steam tunnels. Most of these points were abandoned. There were some minor differences between some points, however, none of the differences were more than one inch. The inspector discussed the use of these survey control marks on the steam tunnel walls with licensee engineers and survey personnel. These discussions disclosed that accuracy of the marks are verified for craft personnel before the craft can utilize any marks for installation of permanent plant equipment. That is, if a craftsman requires line and grade marks as reference points to install a piece of equipment or piping, he is required to contact survey personnel who establish the reference points, or verify the accuracy of marks existing within the structure. Craft personnel are shown which mark to use for their work. These point are generally located as close as possible to the area where they will be working to facilitate their work.

Regarding the effect of differential settlement of structures or piping design, the concern was previously raised by an NRC reviewer from NRR and was addressed by the licensee in response to FSAR questions 241.18, Amendment 6, dated May 1984. This response, which has been reviewed and accepted by NRC, adequately addresses the concern.

Findings

The concern is not substantiated. Differential settlement between structures has been considered in piping design.

h. Concern

Alleger is concerned that surveyors were transferred from QC department to project coordination department. The alleger was of the opinion that since project coordinators are production oriented, surveyors would be subjected to production pressure. He was concerned that surveyors would be pressured to sign QC documents, e.g. concrete pour cards, without having adequate time to check accuracy of work.

Discussion

This concern was also expressed by three different individuals in the licensee's quality concerns programs. These were quality concerns numbers 84V260, 85V0032, and 85V0213. The inspector reviewed the quality concerns and the results of the licensee's investigation of the quality concerns. The licensee concluded in their investigation of these concerns that the surveyors role is a support mode, and not a production or quality control mode. The inspector concurs with this conclusion. The primary function of the surveyors is to provide horizontal and vertical control for all craft personnel, provide dimensional checks for all disciplines, and provide as-built drawings. Survey personnel are also involved in the building settlement monitoring program, and in locating in-place soil density test locations for civil QC inspectors. These are not QC functions, or production functions but rather support functions. Surveyors did not perform the final check or verification that work was completed in a quality manner. This was the function of QC inspectors. The surveyor's function in the concrete placement was to provide dimensional checks for the craft. The signature of the surveyor on the pour card indicates that all survey work required for the placement was completed. The primary purpose of transferring the surveyors to the coordination department was to place the surveyors in a function closer to the actual work they are to perform, and to make them more accessible to the craftsmen they support. The transfer of the surveyors from project QC to project coordination did not affect the quality of survey work. As stated previously, survey errors lead to job delays and rework, and are counter productive.

The inspector discussed this concern with licensee QC and engineering supervisor and with survey personnel. These discussions disclosed that the surveyors were transferred out of the QC department since their work was not a QC function. The surveyors have recently been transferred from the project coordination department to the civil engineering department. A primary reason for this transfer has been that with the project almost finished and building layout completed,

the surveyors are now primarily supporting engineering, e.g., in the preparation of as-built drawings.

Findings

The concern is not substantiated. Assigning the surveyors to work under the project coordination section did not affect the quality of the surveyors work. In addition, survey work is not a quality control function.

i. Concern

The alleger stated that he conducted survey work associated with documentation of location of backfill soil samples from June 1982 to sometime in 1983. This work was performed with another individual. The alleger stated that the procedure (alleger did not specify which procedure) required that a certified surveyor perform this work. The alleger stated that he and the other individual performed this work without any supervison and that neither of them was certified, but that a party chief signed the field book without actually witnessing the performance of the work. The concern is that procedures were violated, that work was performed without supervision, and that a supervisor signed off work without actually knowing if, in fact, it was correct.

Discussion

The procedure which controls survey work is SU-T-01. Control of location of soil samples is specified in procedure CD-T-01. Neither of these procedures require that the individual locating soil test samples be certified. The inspector discussed this problem with licensee survey personnel and the former survey supervisor. These discussions disclosed that the soil samples were located by two individuals. Since determination of the soil sample locations only required performance of simple measurements from known reference points, relatively inexperienced personnel could be assigned to this task. Sometimes, when the survey workload was heavy, only one surveyor would be assigned to this work, and he would be assisted by a QC inspector or construction laborer. The inspector reviewed field books documenting location of backfill soil test samples which was accomplished between April 1982 and September 1983. This review disclosed that the alleger and several other surveyors were involved in location of soil samples. All notes were signed and dated by a party chief. However, the notes only indicated that the party chief checked the notes. Discussions with the former survey supervisor disclosed that the party chief most likely was not present when actual survey work (measurements) was performed. He stated that since work was relatively simple, surveyors would be unsupervised while they made the necessary measurements and documented them in a field book. The survey field book would then be reviewed by the party chief. This primarily involved a math check to verify coordinates of the soil sample location were computed correctly. In addition, a high degree of accuracy was not required in performance

of their work. Knowing the sample location within five or ten feet was sufficient for this work.

Review of the surveyor's training records disclosed that the individual named by the alleger as the other uncertified surveyor who assisted the alleger in performance of soil sample test locations was certified as a Level 1 surveyor in February 1982. Therefore, regardless of the procedure requirements, the individual the alleger performed the soil sample location surveys with was a surveyor who was certified while they worked together.

Findings

The concern was not substantiated. Procedures were not violated while surveying soil sample test locations.

j. Concern

Alleger stated that he was told that small bore stainless steel pipes which come out of the bottom of the reactor vessel pass through the cross wall of the containment wall. Concern is that no pipe sleeves were used to protect the stainless steel pipes when concrete was placed in the wall.

Discussion

The inspector examined the pipes coming out of the bottom of the Unit 1 reactor vessel. These pipes are small bore stainless steel instrument lines which are routed through a pipe chase and terminate at the seal table. The pipes do not pass through any concrete walls.

Findings

This concern was not substantiated.

k. Concern

As-built drawings of the nuclear steam supply system (NSSS) were prepared by Georgia Power Company surveyors. In preparation of these as-built drawings, several discrepancies were noted between Georgia Power Company data and Nuclear Installation Services Company (NISCO) data. This required numerous rechecks of the as-built drawings.

Discussion

NISCO was the contractor who installed the reactor vessel, reactor coolant pumps, steam generators, and pressurizer. The NSSS piping was installed by Pullman - Kellogg. Reference points for installation of the equipment and piping were furnished by Georgia Power surveyors. The as-built drawings of the final installed NSSS system (piping and major components) were made by Georgia Power surveyors. These drawings

will be used by Westinghouse for final stress analysis of the piping system required by IEB 79-14.

The inspector examined Bechtel Specification X4AZ06, Division N2, NSSS Installation, Major Component Field Handling, Installation, and Setting. This specification provides tolerances for installation of the NSSS components and specifies type of surveying instruments to be used. Setting of the NSSS components in accordance with specification requirements (tolerances) required very accurate and precise surveys. These surveys were conducted by NISCO using survey reference points provided by Georgia Power. Equipment was installed at locations within the containment specified by Westinghouse. Tolerances were specified in the specification for installation of equipment, e.g., vertical alignment (plus or minus ½ degree) elevation (plus or minus 1/32 inch off theoretical center line), horizontal location (plus or minus ¼ inch from theoretical center). Installation of the piping causes slight movement of the NSSS components from stresses built up during pipe fitup and welding. In order to assure that the NSSS components and piping configuration are within design parameter used in piping stress analysis, it is necessary to prepare an as-built drawing of the NSSS system. The requirements for the as-built drawings were specified in Westinghouse letter number GM-DAB-51, dated October 23, 1985.

The inspector discussed the NSSS as-built drawings with Georgia Power survey personnel. These discussions disclosed that some minor problems were encountered during preparation of the as-built, but that these were resolved without difficulty. The inspector examined field book numbers SCI-38, 39, 40, and 41 which contain survey data used for preparation of the as-built details. The field books data did not indicate if numerous rechecks for the as-built details had been performed, although some data had been double and triple checked to assure accuracy.

The inspector questioned NISCO, Westinghouse, and Georgia Power engineering regarding conflicts between NISCO and Georgia Power data. None of the individuals questioned knew of any conflicts. In fact, since the intent of the two surveys was different, no comparison was made between the two sets of data.

Findings

The concern is not substantiated. No discrepancies were noted between NISCO and Georgia Power data. NISCO data was used to set NSSS equipment to locations shown on design drawings. Georgia Power data was used to show actual locations of equipment. Thus, some slight differences between theoretical installed location and and final as-built locations are expected due to construction activities and tolerances. The purpose of the as-built drawings is to identify these differences.

l. Concern

Alleger is concerned that notes recorded in field books pertaining to settlement readings may have been altered to indicate buildings were not settling. Alleger stated that the settlement notes may have been altered as a result of the alleger's contacting NRC in January 1985 concerning settlement of Category I structures.

Discussion

The inspector examined field books in which settlement data was recorded. The inspector did not see any entries which had been erased in the book. There were several pages which had been corrected by crossing through a number and writing a correction next to it. In a few cases, data on an entire page was crossed out due to a survey error, and the work for this page was repeated.

As stated above, NRC Region II inspectors have been periodically reviewing settlement data since March 1980. In addition, the licensee submitted up-to-date settlement data to NRC in May 1984 in response to NRC Office of Nuclear Reactor Regulations questions (FSAR Amendment 6). This was several months prior to when the alleger contacted NRC.

Findings

The allegation is not substantiated. Field book entries have not been altered.

m. Concern

Water is leaking through the north wall of the Control Building at the D level. The allegers indicated that they observed water coming out of cracks in the wall. They were told that the wall had been backfilled before the concrete set up and that this was the cause of the water leakage through the wall.

Discussion

A similar concern was expressed by the same individual when he initially contacted NRC in January 1985. This concern was addressed in paragraph 9.a of NRC Inspection Report 50-424/85-53 and 50-425/85-38, dated December 24, 1985. The inspector re-examined drawings for all structures in the power block and walked down all levels of structures in the power block below ground level. The inspector also discussed water leakage problems and placement of concrete and backfill in the control building with quality control inspectors and engineers and examined records relating to backfill and concrete placement for the control building.

Review of drawings showed that the bottom of the control building is at B level at elevation 180 and that only the auxiliary building has a D level. Discussions with QC inspectors and engineers and examination of records disclosed that backfill was placed against the north wall of the control building before the specified time. This was identified by a QC inspector in Deviation Report CD-1762 dated February 17, 1982. The deviation report stated that backfill was placed against the north wall of the control building to elevation 196 which was contrary to requirements that no backfill be placed above elevation 186 before placement of the level A concrete slab which ties into the north wall at elevation 200. The problem was submitted for engineering review and as a result the backfill was removed. Analysis by design engineers showed that no structural damage was done to the north control building wall. A walkdown of the control building showed no evidence of water leaking through cracks in the wall. During past inspections the inspector has observed water leaking down the north wall of the control building where pipes extend from a floor drain in the electrical tunnel through the A level wall. Examination of the pipes showed that water has leaked through the pipe sleeves that serve as a penetration for the drain pipes. Discussions with responsible engineers and examination of drawings indicate this leakage was due to water entering the temporary backfill overlying the electrical tunnel and following along the drain pipes to where they penetrate the north wall of the control building. During a walkdown of the auxiliary building D level (the only powerblock structure with a D level), the inspector did notice that water has leaked through cracks in the north wall. This has been an ongoing problem and several efforts have been made to seal these cracks. The inspector has observed water leaking through the cracks in past inspections. During this inspection it appeared that progress has been made in sealing these cracks. This leakage is considered a nuisance and maintenance problem and is not considered a safety problem.

Findings

Investigations showed that backfill was placed against the north wall of the control building before the specified time. This was identified and investigated by the licensee. The backfill was removed and the structure was evaluated to determine if the backfill had caused any structural damage. Some water has leaked through the north wall of the control building where drain pipes pass through pipe sleeves. Leakage in these areas seem to have stopped. The only structure with a D level is the auxiliary building. Inspections have shown that water has leaked through cracks in the north wall of this structure. The licensee has had an on going program to seal these cracks and to minimize water leakage. This is an ongoing nuisance and maintenance problem and is not a safety problem.

n. Concern

There was confusion in how to determine voids on transitional Cadwelds in the Unit 1 dome. Bread wrapper ties were used to check the Cadwelds. The alleger did not personally know of any defective Cadwelds in the dome, but is concerned that some of the Cadwelds could be questionable because of lack of proper guidelines for cadweld inspectors.

Discussion

The inspector reviewed test records for cadwelds, discussed inspection of Cadwelds with QC inspectors, civil engineers and QC supervisors, and observed Cadwelds being made in the auxiliary buildings.

Discussions with civil engineers, QC inspectors and QC supervisors showed that there was confusion in inspection of cadweld voids for the Unit 1 dome. Deviation Report CD-4546 was written to address the problem. This deviation report showed that 17 Cadwelds had unacceptable voids and that these Cadwelds had previously been inspected and accepted. The discrepancy apparently occurred because the first inspector who accepted the Cadwelds used a 1/16 inch diameter tie wire (type used in fastening reinforcing steel) to measure the voids while the second inspector who rejected the cadwelds used a 1/64 inch diameter hold tag wire (similar to a bread wrapper tie wire) to inspect the voids.

As a result of this deviation three of the rejected cadwelds were cut out and tested in tension under a loading of 95,000 psi. None of the Cadwelds failed under this loading. Test requirements require that the tensile strength of each sample tested must equal or exceed 125 percent of the minimum yield strength specified in ASTM-A 615 for the grade of reinforcing bar being used. Also, the required average tensile strength of each group of 15 consecutive splice samples tested must equal or exceed the ASTM specified minimum ultimate strength for the grade of reinforcing steel being used. Reinforcing steel being used at the site is grade 60 which has a minimum yield strength of 60, 000 psi and a minimum ultimate strength of 90,000 psi. Thus, the requirements for Cadwelds at the site are that each test must equal or exceed 75,000 psi (1.25 X 60,000 psi) and that the average tensile strength of each group of 15 consecutive splices must equal or exceed 90,000 psi. Results of the tensile tests showed that these requirements were exceeded even though they were reported to have excessive voids. In addition to the above tests, ERICO Products Incorporated (the Cadweld supplier) provided tensile test results made on Cadwelds with excessive voids. Results of these test showed that the minimum ultimate tensile strength was exceeded on each Cadweld even though they had excessive voids.

Because of confusion resulting from the different tie wires being used to inspect the voids, all of the rejected Cadwelds were reinspected by civil QC inspectors and civil field engineers. This reinspection method which was a more rigorous and accurate method involved using the 1/16 inch diameter tie wire to take multiple depth measurements instead of the standard method which involved taking one measurement at the deepest point. Results of this inspection showed that the Cadwelds which were rejected because of excessive voids actually had acceptable void limits and that they should not have been rejected. Because of the apparent confusion in inspection of voids in Cadwelds, all civil QC inspectors were retrained in methods for establishing dimensions of voids occurring in Cadwelds and the correct process for calculating the cumulative void area. Observations of Cadweld operations and discussion with civil QC inspectors and QC supervisors during this inspection showed that they understood the specified method for calculating the void limits and that the specified 1/16 inch diameter tie wire was being used to measure void depths.

During inspections performed May 6-20 and 20-24, 1985, the inspector examined all tensile test results of Cadweld splices on numbers 11, 14, and 18 reinforcing bars in the vertical and horizontal position and deficiency reports for all test results less than 125 percent of the minimum specified bar strength. Examination of this tensile test data showed the rate of Cadweld failure has been very low at the Vogtle project (approximately 0.3 percent). Examination of deficiency reports showed that tensile test failures were being properly addressed by the licensee.

Findings

Investigation showed that there was some confusion regarding the measurement of voids in the transitional Cadwelds of the Unit 1 dome. The investigation also showed that hold tag wires (1/64 in diameter) similar to a bread wrapper tie wire were sometimes being used to measure voids instead of the recommended 1/16 inch diameter tie wire used in fastening reinforcing steel. Use of the smaller diameter wire resulted in the rejection of Cadwelds that had been previously inspected with the 1/16 inch diameter tie wire and accepted. Deviation report CD-4546 was written to address the problem and some of the rejected Cadwelds were cut out and tested. Test results showed that the Cadwelds exceeded design requirements. In addition to these tests the vendor, Erico Products, provided test results that showed that even when Cadwelds had excessive voids the design tensile strengths were exceeded. A reinspection of the Cadwelds rejected for excessive voids showed that they were acceptable, that the use of the hold tag wire that was similar to a bread wrapper tie was not a good device for measuring voids, and that its use sometimes resulted in erroneous reporting of excessive voids. As a result of the confusion in measurement of voids, all the QC inspectors were retrained in measuring and calculating the dimensions of voids. Discussions with QC inspectors and QC supervisors showed they were knowledgeable in the

method of void determination. Review of Cadweld data during routine inspections showed that there has been a very low failure rate (approximately 0.3 percent) and that Cadweld operations have been performed in an acceptable manner.

o. Concern

Alleger overheard that the containment building had sank 3.75 inches on one side and that it was only supposed to settle 4.25 inches when it was loaded and subject to vibration. The alleger is concerned that containment building settlement is a problem that management is trying to cover up.

Discussion

The inspector examined the FSAR, SER, and settlement data on the Units 1 and 2 containment buildings from 1979 to 1986. Examination of the FSAR showed that the anticipated settlement of the Units 1 and 2 containment buildings is 4.1 inches on the north and south sides, 4.0 inches on the east side of Unit 1 and 4.0 inches on the west side of Unit 2, 4.2 inches on the west side of Unit 1 and 4.2 inches on the east side of Unit 2, and 4.3 inches in the center of both units. Review of settlement data showed that the maximum settlement in Unit 1 is 3.2 inches and 2.67 inches in Unit 2. The licensee in a letter dated May 21, 1985, has committed to provide the NRC with an updated report on settlement at least 3 months before fuel loading of Unit 1. Also in the FSAR Section 2.5.4.13.2, Settlement Monitoring, the licensee has committed to the monitoring of settlement in all Category I structures at approximately 60 day intervals through the first year following issuance of an operating license for Unit 2 and immediately following an earthquake. Subsequently, frequency and duration of settlement monitoring will be based on the evaluation of the data obtained. Evaluation of settlement data by the NRC is discussed in Section 2.5.4.4.3 of the NRC Safety Evaluation Report (SER) issued in June 1985 and Supplement 1 of the SER issued in October 1985. Continuing evaluation of settlement has been identified as confirmatory item 7. The applicant's reports on settlement will be evaluated and reported in future supplements to the SER.

Findings

There has been about 3.2 inches of settlement in the Unit 1 containment building and about 2.67 inches in the Unit 2 containment building. Evaluation of settlement data to date shows that the settlements are within the predicted FSAR values and that the settlements have been relatively uniform. The applicant has been monitoring settlement and sending reports on the settlement to the NRC. Evaluation of these reports have beam made by reviewers from the NRC office of Nuclear Reactor Regulation (NRR) and Region II inspectors. The licensee has committed to provide the NRC with an updated report on settlement three months before fuel loading of Unit 1. This report will be evaluated

and a report issued on the evaluation as a supplement to the SER. The settlement monitoring program has been reviewed by Region II inspectors since March 1980.

p. Conclusions

Of the 13 concerns examined, three were substantiated, and two were partially substantiated. However, these items had already been identified and corrected by the licensee's QA program, or they were of no safety significance. The remaining eight concerns were not substantiated.

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