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

Report Nos.: 50-438/83-18 and 50-439/83-18

Licensee: Tennessee Valley Authority
500A Chestnut Street
Chattanooga, TN 37401

Docket Nos.: 50-438 and 50-439

License Nos.: CPPR-122 and CPPR-123

Facility Name: Bellefonte 1 and 2

Inspection at Bellefonte site near Scottsboro, Alabama

Inspectors: R. W. Wright — 8/30/83
R. W. Wright — Date Signed

C. R. McFarland — 8/30/83
C. R. McFarland — Date Signed

Approved by: C. M. Upright — 8/31/83
C. M. Upright, Section Chief — Date Signed
Engineering Program Branch
Division of Engineering and Operational Programs

SUMMARY

Inspection on August 1-5, 1983

Areas Inspected

This routine, unannounced inspection involved 68 inspector-hours on site in the areas of QA inspection of civil (anchor bolts) and mechanical/piping installation work activities; licensee action on previous enforcement matters; and licensee identified (10 CFR 50.55(e)) items.

Results

Of the four areas inspected, no violations or deviations were identified.

REPORT DETAILS

1. Persons Contacted

Licensee Employees

*L. S. Cox, Project Manager
*B. J. Thomas, Construction, Quality Manager
*D. R. Bridges, Assistant Quality Manager
*T. F. Newton, Assistant Quality Manager
*P. C. Mann, Supervisor, Nuclear Licensing Unit
*J. T. Barnes, Supervisor, QA Unit
*D. E. Nixon, Supervisor, Civil QC Unit B
*F. J. Huffman, Assistant Construction Engineer Staff (ACE)
*D. F. Smith, Mechanical/Welding, ACE
*G. W. French,, ACE Startup, Coordination/Flushing
*T. M. Brothers, ACE, Hangers/Civil
*E. Bennich, ACE, Electrical/Instrumentation
*D. Maroney, Materials Services, QC
W. G. Guffey, Engineering Aid, Hanger QC
V. L. Parde, Engineering Aid, Instrumentation QC
D. K. Gibbs, Engineering Aid, Civil QC
D. R. McBee, Engineering Aid, Concrete and Soils Inspection and Testing
R. A. Roland, Engineering Aid, Concrete and Soils Inspection and Testing
T. L. Carson, Hanger and Anchor, QC
G. Lyles, Group Leader, Mechanical Engineering Unit (MEU)
J. Tabb, Engineer, MEU
A. Loftis, Engineer, MEU
R. T. McCollum, Supervisor, Mechanical QC
R. E. Wrobel, Mechanical QC Inspector
D. W. Gibson, Welding QC Inspector
G. Greer, QA Engineer
W. M. Copeland, QA Auditor

Other licensee employees contacted included several construction craftsmen, technicians, QA/QC personnel, engineers, and records personnel.

NRC Resident Inspectors

*J. D. Wilcox
*M. Branch

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on August 5, 1983, with those persons indicated in paragraph 1 above.

3. Licensee Action on Previous Enforcement Matters

a. (Closed) Violation 50-438, 439/83-07-01: Measuring and Test Equipment. TVA's response dated May 16, 1983, has been reviewed and determined acceptable by Region II. The inspector conducted discussions with the measuring and test equipment and laboratory personnel, examined the laboratory facilities, and verified that the subject damaged and/or out-of-calibration equipment had been either retired, recalibrated, or properly tagged "Hold, Do Not Use Until Calibrated". Procedure BLN-QCP-10.11 has been revised to alert potential users of test equipment to check for current calibration stickers prior to use. Instructions have been given to all affected groups (Memorandum dated 6/16/83 to all engineering and QC unit supervisors from Bellefonte Quality Manager) to return any damaged or out-of-calibration equipment to the test laboratory for repair/calibration. The corrective actions specified in the licensee's letter of response have been implemented and should preclude recurrence of similar circumstances.

b. (Closed) Violation 50-438, 439/83-11-01: Inadequate QC Inspector Education and Experience Requirements. The subject violation was closed per Region II letter to H. G. Parris from the Regional Administrator dated July 12, 1983.

c. (Closed) Violation 50-438/83-11-03: Failure to Initiate an NCR to Obtain ENDES Review and Approval of Incore Monitoring System Skewed Dutchman. TVA's response dated June 27, 1983, has been reviewed and determined acceptable by Region II. The inspector examined NCR 2352 which TVA subsequently initiated to document the offset/mismatch of the dutchman and to otain ENDES review and disposition of the nonconformance. This NCR was determined significant and has been reported to the Region under the provisions of 10 CFR 50.55(e). The problem appeared to be an isolated case in that a responsible site engineer felt that he could apply a B&W specification for resolution of an NCR-type problem. The inspector concluded that TVA has determined the full extent of the subject nonconformance, the corrective actions identified in the letter of response have been implemented, and this item can now be tracked under the above mentioned reporting mechanisms.

4. Unresolved Items

Unresolved items were not identified during this inspection.

5. QA Inspection of Civil Work Performance (50-438/83-21B)

The inspector observed the job-proportioned dry-pack mortar being made; the placement and dry-packing operations of anchor bolts in reactor building Unit No. 1, component MK3-3; the curing activities and the molding of dry-pack specimens for compressive strength testing; and the laboratory testing of a dry-pack speciman. Additionally, the inspector observed the pull testing of expansion shell anchors (SSD anchors) for electrical

installations in the Unit 1 reactor building (Report Nos. R646-00248 and 00249) by civil QC and the torque testing of a grouted anchor bolt (Report No. H-669) in the auxiliary building by the hanger QC (HQC) group.

This inspection was performed to determine whether site work is being performed in accordance with NRC requirements and SAR commitments, that the QA/QC program is functioning in a manner to assure that requirements and commitments are met, and that prompt and effective action is taken to achieve permanent corrective action on significant discrepancies.

a. Acceptance Criteria

The following acceptance criteria were examined to verify the inspection objectives:

- Procedure BNP-QCP-2.8, R10, Bolt Anchors Set in Hardened Concrete
- Procedure BNP-QCP-5.5, R7, Grouting and Dry-Pack
- Procedure BNP-QCP-10.6, R13/A5, Work Release
- Procedure BNP-QCP-10.11, R9, Calibration of Measuring and Test Equipment
- Procedure BNP-QCP-10.14, R3, Anchor Bolt Freeze Protection
- Construction Specification G-51, Appendix C, Method of Test for Compressive Strength of Dry-Pack
- Construction Drawings:
  4RW0550-X2-03, R0
  5RW0818-RU02, R9
  5RW0817-RU02, R3
  5RW0816-RU03, R9

The inspector reviewed the above listed acceptance criteria utilized for the subject civil work activities inspected to determine if the latest revisions were employed and in agreement with the SAR, and to determine if these documents adequately describe critical points and methods of installation as well as inspection and test hold points which properly reflect design intent.

Within the area, no violations or deviations were identified.

b. Field Inspection

The inspector verified that the anchor installations were installed as described by approved drawings and procedures. Quality Control investigation report (QCIR) No. 32799 and anchor spacing variance No. H-1559 which affected the subject installations were found to be

properly controlled, reviewed, dispositioned, and approved by procedure. As per procedure BNP-QCP-2.8, R10, the HQC inspectors verified the anchor spacing with approved installation drawings and necessary spacing variances at the time of the torque testing. No problems were identified with anchor spacings; however, licensee HQC inspectors wrote a QCIR to identify an erroneous dimension on Variance No. H-1559, R1 sheet 2 which depicts the distance between reference point A11 and the centerline of plate 2KE-MPHG-0304FRI at being 10'-0" while its actual measurement was 9'-3 3/8". The inspector observed the craftsmen and foremen associated with the dry-pack anchor bolt operations and the crafts involved in SSD anchor installation and determined that their level of knowledge was adequate to provide the required quality of workmanship.

Within this area, no violations or deviations were identified.

c. Quality Control

The inspector reviewed the following inspection records associated with the subject dry-packing and anchor bolt installations to determine their adequacy, whether deficiencies submitted by QC inspectors received proper corrective action where applicable, and if work and work controls were adequate: work releases, dry-pack card, dry-pack mortar inspection form, compressive strength data, dry-pack curing report, bolt anchor test reports, anchor spacing variances, and measuring and test equipment calibration records.

The inspector reviewed the applicable QA/QC procedures (paragraph 5.a) to determine if the frequency, timing, and acceptance criteria for the inspection was adequate. The number of QC inspectors provided for the coverage of the subject anchor installations was satisfactory. Discussions were conducted with randomly selected civil and hanger QC inspectors to determine if their knowledge of the activities they were observed inspecting was adequate, and to determine whether they felt their findings and concerns received proper management attention. The Region II inspector concluded that licensee management was attentive and responsive to QC inspector identified problems. The inspectors examined were very knowledgeable of their inspection functions and acceptance criteria and they were proficient in the performance of their assigned functions.

The inspector examined the subject inspectors' training, qualification, and certification records to verify that they had been properly qualified in the functions they perform.

Within this area, no violations or deviations were identified.

d. Nonconforming Items Reports (NCRs)

The inspector reviewed selected reports of civil and anchor installation discrepancies that have occurred during various work activities to verify that:

(1) the action taken corrected the items
(2) the items were considered for reportability to NRC
(3) the instituted effective action prevented recurrence
(4) the licensee has an adequate program to detect trends in discrepancies

The following were reviewed: NCRs 2366, 2314, 2263, 2078, 1863, 1718; and QCIRs 33270, 30491, 30620, 27542, 21758, 15968, 34739, 34599, 34237, and 34953.

Within this area, no violations or deviations were identified.

e. Materials and Equipment

The inspector examined the below listed testing and measuring equipment being employed during the anchor bolt installation and testing activities for current calibration stickers and applicable test records to support the calibration:

| Item | Period of Calibration |
|---|---|
| Pressure Gage CEU-P-27 | 07/26/83 - 09/26/83 |
| Ram ID No. 1 | 02/18/83 - Present |
| Torque Wrench ID HEU-066 | 06/09/83 - 12/07/83 |
| Forney Tester ID TVA 415917 | 07/11/83 - 01/11/84 |
| Scale TVA 475790 | 02/23/83 - 08/23/83 |
| Stopwatch ID 196697 | 11/22/83 - 11/22/83 |

Within this area, no violations or deviations were identified.

f. Audits and Construction Surveillance

The inspector reviewed the following audits and surveillance which had been performed on various phases of anchor bolt installation activites:

Audit BN-C-82-02, O&CEU Testing/Inspection of Expansion Bolt Anchors
Audit BN-M-82-10, Pipe Hanger Installation and Inspection
Surveillance BLNS-18.19, Anchor Bolt Freeze Protection

The above surveillance/audits were examined to determine if they were meaningful, effective, reflect quality performance, and whether corrective actions taken as a result of surveillance/audit findings were proper, timely, and complete.

Within this area, no violations or deviations were identified.

6. In-Depth QA Inspection of Performance (35061B)

a. Field Drawings and Work Procedures

The inspector reviewed the status of mechanical construction activities underway with the supervisor of the Mechanical Engineering Unit (MEU) and selected to inspect work related to the Unit 1 and Unit 2 essential raw cooling water (ERCW) piping and the Unit 1 core support assembly (CSA). The ERCW work is defined in engineering change notice (ECN) 1457, the drawings noted on revisions 1 and 2 of the data sheets for ECN 1457, and the sequence control chart (SCC) for ECN 1457. About 5000 feet of embedded ERCW drain piping made of carbon steel is to be replaced by exposed four-inch diameter stainless steel piping.

The CSA work is defined in NCR 2267, Revision 1, the SCC for NCR 2267, TVA internal memorandum dated April 28, 1983, and June 30, 1983, and the first interim 10 CFR 50.55(e) report to NRC Region II dated March 30, 1983. Improper welding of the Unit 1 reactor CSA baffle plate locking pins by Babcock and Wilcox Company (B&W), the supplier, is the root cause of NCR 2267.

The design changes for ECN 1457 are to be approved by the offsite engineering design (ENDES) division of TVA. The design changes for NCR 2267 are developed by ENDES in accordance with the information provided by B&W. The control of the design procedures by ENDES appears to be effective for the on site needs. The procedures for the piping work for ECN 1457 have been the same as used on other on site piping work. The inspector reviewed procedures for NCR 2267 which are essentially B&W craft procedures adapted for use by TVA craft plus TVA quality control (QC) procedures. The work procedures appear to adequately reflect the design intent.

b. Field Inspection

The inspector observed representative samples of field fabrication work and temporary supports for the ERCW piping in the Unit 1 auxiliary building. The field drawings and construction specifications observed by the inspector appear to be adequate. The status of work precluded the appropriateness of making physical measurements at this inspection.

The inspector observed the rework of representative samples of the weld repairs of the locking pins for the CSA baffle plate bolts. The reactor internals are being stored in the refueling canal. The repair work is not complete. No work was in progress at the time of the inspection. The inspector discussed each of the above activities with the responsible MEU engineers and QC inspectors.

The inspector observed the field fabrication of selected samples of stainless steel ERCW piping in Unit 1 auxiliary building and discussed the work with three welders and one welding foreman. Their knowledge of the work appeared to be adequate to perform the work. The welder's

qualification cards were appropriate for the procedures and drawing specifications being used.

c. Field Engineer/Engineering Reports

The field engineer's engineering reports of deficiencies are documented on the ECN and NCR forms. Various methods of marking the status of work on construction drawings, inspection plans, and sequence control charts are used to assure adequate work control.

d. Quality Control

The inspector reviewed the QC inspection procedures and work associated with ECN 1457 and NCR 2267 with the appropriate QC inspectors assigned to ECN 1457 and NCR 2267. Through a review of qualifications records the inspector determined that the inspectors for ECN 1457 and NCR 2267 had the necessary qualifications for the level of work performed. The inspector discussed similar mechanical QC inspections with other inspectors. The management commitment to QC, the numbers of mechanical QC inspectors available, and the inspectors' knowledge of their work appears to be adequate.

e. Nonconforming Item Reports (NCRs)

Nonconforming items are reported as ECNs and NCRs for construction deficiencies. The TVA system for corrective action verifies that the action taken corrects the deficiencies, determines the cause of the deficiency, considers reportability to the NRC, and institutes action to prevent recurrence. NCR 2267 has been reported to the NRC under 10 CFR 50.55(e) and 10 CFR 21. The inspector examined the hardware where corrective action has been taken for ECN 1457 and NCR 2267; the extensive corrective action required for each item had not been completed at the time of this inspection. The need for a more effective corrective action program has been recognized by the TVA and has been recently documented in response to a violation cited on the Watts Bar Nuclear Plant (50-390/83-19-01 and 50-391/83-15-01). The TVA response dated August 5, 1983, documents their recognition that the corrective action applies to work on all TVA nuclear plants.

f. Materials and Equipment

The inspector reviewed TVA specifications and vendor documentation to verify that the materials and equipment used were correct for the corrective actions for ECN 1457 and NCR 2267. The documentation appears to be adequate.

g. Audits

The inspector reviewed the TVA Construction QA Branch (CQAB) Audit (Knoxville personnel) Quarterly Verification Plan and Schedule and met the auditor conducting an audit of Bellefonte Nuclear Plant (BLNP).

The scope of the August 1-5, 1983, audit was to verify activities related to preparation and maintenance of policies, procedures and instructions; definition of requirements for preparation and maintenance of instructions, procedures, and drawings for quality affecting work activities; and preparation and maintenance of construction procedures, instructions, drawings, and sketches. An audit of field change requests and the verification of as-built configuration is to be conducted August 22-26, 1983. An audit of training, qualification, and certification of personnel is to be conducted September 20-23, 1983. Site QA engineers routinely participate in the CQAB audits of BLNP and, occasionally, other plants.

The site quality verification staff were conducting surveillances related to engineering, training, qualification, and certification of personnel and of heat exchanger work on August 1-6, 1983. Other surveillances for this quarter related to mechanical engineering work were conducted in July 1983 and will be conducted in August and September 1983. The inspector reviewed the May 2, 1983, surveillance report BLNS-19.0 of work related to mechanical piping in the auxiliary and reactor buildings and the followup results dated July 7, 1983. The inspector also reviewed the Surveillance Guide Sheet No. 20.8 for surveillance of "Internal Wire Verification and Contact Configuration" as a typical example of the surveillance actions required to be documented in comparison to similar guidance for surveillances of mechanical equipment. The inspector discussed surveillances and audits with site QA engineers and reviewed representative samples of surveillances conducted in 1983.

Within this area, no violations or deviations were identified.

7. Licensee Identified Items (92700B)

a. (Closed) LII CDR 438/82-32; CDR 439/82-29, "QA Deficiencies at Nutherm International" (10 CFR 50.55(e)). The final report was submitted on January 11, 1983. The report has been reviewed and determined to be acceptable. The inspector held discussions with responsible licensee representatives, reviewed supporting documentation, and observed representative samples of work during the May 31 - June 3, 1983, inspection of the Office of Engineering Design and Construction in Knoxville, Tennessee to verify that the corrective action identified in the report has been completed. This matter is closed based on TVA's reaudit of Nutherm's revision to the procedure for recording adequate test information.

b. (Closed) LII CDR 438,439/82-12, "Regional Quality Engineering Branch Office Manpower" (10 CFR 50.55(e)). The final report was submitted on March 18, 1983. The report has been reviewed and determined to be acceptable. The inspector held discussions with responsible licensee representatives, reviewed supporting documentation, and observed representative samples of work during the May 31 - June 3, 1983, inspection of the Office of Engineering Design and Construction in

Knoxville, Tennessee to verify that the corrective action identified in the report has been completed. This matter is closed based on TVA's implementation of a manpower forecasting program, the present availability of inspectors, and the status of work at the TVA regional offices.