



UNITED STATES
ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION II - SUITE 818
230 PEACHTREE STREET, NORTHWEST
ATLANTA, GEORGIA 30303

TELEPHONE: (404) 826-4503

JAN 16 1974

In Reply Refer To:
RO:II:LEF
50-390/73-3
50-391/73-3

Tennessee Valley Authority
Attn: Mr. J. E. Watson
Manager of Power
818 Power Building
Chattanooga, Tennessee 37401

Gentlemen:

This refers to the inspection conducted by Messrs. L. E. Foster and W. B. Swan of this office of activities authorized by AEC Construction Permit Nos. CPPR-91 and CPPR-92 for the Watts Bar 1 and 2 facilities, and to the discussion of our findings held by Mr. Foster with Mr. J. C. Killian at the conclusion of the inspection.

Areas examined during the inspection and our findings are discussed in the enclosed inspection report. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with personnel, and observations by the inspector.

Within the scope of this inspection, no violations were disclosed.

One new unresolved item resulted from this inspection and is identified in Section III of the summary of the enclosed report. This item will be examined on subsequent inspections.

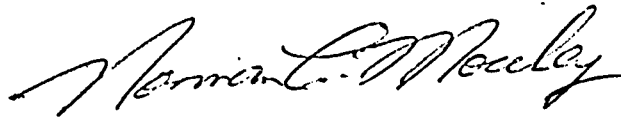
In accordance with Section 2.790 of the AEC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations, a copy of this letter and the enclosed inspection report will be placed in the AEC's Public Document Room. If this report contains any information that you believe to be proprietary, it is necessary that you submit a written application to this office requesting that such information be withheld from public disclosure. If no proprietary information is identified, a written statement to that effect should be submitted. If an application is submitted, it must fully identify the bases for which information is claimed to be proprietary. The application should be prepared so that

JAN 16 1974

information sought to be withheld is incorporated in a separate paper and referenced in the application since the application will be placed in the Public Document Room. Your application, or written statement, should be submitted to us within 20 days. If we are not contacted as specified, the enclosed report and this letter may then be placed in the Public Document Room.

Should you have any questions concerning this letter, we will be glad to discuss them with you.

Very truly yours,



Norman C. Moseley
Director

Enclosure:
RO Inspection Report
Nos. 50-390/73-3
and 50-391/73-3

Letter to Tennessee Valley Authority

dated JAN 16 1974

50-390/73-3
and 50-391/73-3

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RO Inspection Report Nos. 50-390/73-3 and 50-391/73-3

Licensee: Tennessee Valley Authority
818 Power Building
Chattanooga, Tennessee 37401

Facility Name: Watts Bar Nuclear Plant Units 1 and 2
Docket Nos.: 50-390 and 50-391
License Nos.: CPPR-91 and CPPR-92
Category: A2/A2

Location: Spring City, Tennessee

Type of License: W PWR, 1160 Mwe

Type of Inspection: Routine, Unannounced

Dates of Inspection: December 12-14, 1973

Dates of Previous Inspection: October 25-26, 1973

Principal Inspector: L. E. Foster, Reactor Inspector
Facilities Section
Facilities Construction Branch

Accompanying Inspector: W. B. Swan, Reactor Inspector
Engineering Section
Facilities Construction Branch

Other Accompanying Personnel: None

Principal Inspector: L. E. Foster
L. E. Foster, Reactor Inspector
Facilities Section
Facilities Construction Branch

1/9/74
Date

Reviewed by: W. A. Crossman
W. A. Crossman, Senior Inspector
Facilities Section
Facilities Construction Branch

1/9/74
Date

SUMMARY OF FINDINGS

I. Enforcement Action

A. Violations

None

B. Safety Items

None

II. Licensee Action on Previously Identified Enforcement Matters

A. Violations

The following violation resulted from a vendor inspection at Rotterdam Dockyard Company, Rotterdam, The Netherlands.

73-1-A1 (999-39) Control and Audit of Purchased Equipment

Contrary to Criteria VII and XVIII, there was no evidence that the licensee had established an audit program that includes, detailed implementation procedures, checklists or frequency of audits for the TVA, Baden, Switzerland, office representative responsible for the inspection of the reactor pressure vessel being fabricated by the Rotterdam Dockyard Company. (RO Report 73-2)

B. Safety Items

None

III. New Unresolved Item

73-3/1 Schedule for Site Audits

TVA is performing site audits; however, a schedule of planned audits has not been developed. RO will examine TVA's audit schedule during the next inspection. (Details I, paragraph 4)

IV. Status of Previously Reported Unresolved Items

The following unresolved item resulted from a vendor inspection at Rotterdam Dockyard Company, Rotterdam, The Netherlands.

73-2/1 (999-39) Design Review and Documentation

Documentary evidence was not available to determine if the reactor vessels are in conformance with the requirements of the ASME Code, Section III, 1973 Edition and including the Addenda through Winter of 1971. (RO Report 73-2)

V. Design Changes

None

VI. Unusual Occurrences

None

VII. Other Significant Findings

A. Project Status

Overall construction is 4% complete. Approximately 4000 cubic yards of Class I concrete has been placed. Construction of warehouse storage buildings is 95% complete.

Cooling Tower Contractor (Research-Cottrel, Inc.) has started concreting for No. 1 cooling tower foundation.

B. Personnel

Approximately 1100 TVA personnel are presently on site.

L. D. Weber has been appointed Chief, DED QA Staff, Knoxville.

C. Training Program

J. R. Nickell, Watts Bar Training Officer, is on site. Some training classes have been held and others are being planned.

VIII. Management Interview

The scope and results of the inspection were discussed with J. C. Killian, Project Manager, members of his staff and L. D. Weber, Chief, DED QA Staff at the conclusion of the inspection.

DETAILS I

Prepared by: L. E. Foster
L. E. Foster, Reactor Inspector
Facilities Section
Facilities Construction Branch

1/11/74
Date

Dates of Inspection: December 12-14, 1973

Reviewed by: W. A. Crossman
W. A. Crossman, Senior Inspector
Facilities Section
Facilities Construction Branch

1/11/74
Date

1. Persons Contacted

Tennessee Valley Authority (TVA)

J. C. Killian - Project Manager
T. B. Northern, Jr. - Construction Engineer
L. C. Northard - Supervisor, Quality Control and Records Group
R. L. Heatherly - QA Engineer
A. W. Rogers - QA Engineer
C. E. Thompson - QA Engineer
L. D. Weber - Chief, DED QA Staff (Knoxville)

2. Organization

The organization chart and descriptions of QA functions for Watts Bar project were examined by the inspector. The personnel performing QA functions report to the Construction Engineer, who in turn reports directly to the Project Manager. The QA personnel are independent of those performing the work as the persons performing the construction work report through the Construction Superintendent, who reports to the Project Manager.

The QA personnel's responsibilities, authority, position descriptions and functional assignments are stated in written documents and procedures. Experienced personnel have been selected to cover the mechanical, electrical and civil areas. A Quality Control and Records Group prepares procedures, audits other disciplines and maintains quality records.

Corporate QA groups (OEDC and DED-Knoxville) are separate from the site QA group and report directly to the Manager of OEDC (Knoxville).

From observation of work being performed, examination of organizational charts and other documents, it appears that the QA organization meets 10 CFR 50 Appendix B requirements.

3. Quality Assurance Program

The applicant has established a QA program (corporate and site) and from the inspector's observations, the applicant is progressing in the development of the program. The applicant's basic policies are stated in Chapter 17 of the PSAR and these policies are being further expanded in the form of QA manuals, documents, procedures and instructions. A corporate quality assurance manual is being prepared for all TVA plants. The inspector examined several draft QA construction procedures which are presently being reviewed by TVA management. The "Table of Contents" for the QA manual was reviewed and a copy was obtained for the RO office. RO will continue to review and evaluate the development and implementation of TVA's overall QA program.

4. Audits

TVA's DEC QCP-Q.5 and PSAR Chapter XVII specifies the audit requirements for Watts Bar. This procedure requires periodic audits, audit checklists, trained personnel, independence of auditing personnel, documentation, followup action, review by management and re-audits where necessary.

Watts Bar site personnel have conducted two audits and OEDC (Knoxville) has conducted one site audit. The inspector reviewed the above audits and found that the audits were performed by qualified personnel and that audit checklists were used, corrective action recommended and followup action initiated. The inspector has no further questions on the audits reviewed; however, TVA has not prepared a schedule of planned audits for site activities. TVA management stated that they will prepare a tentative schedule of planned audits. RO advised TVA that this is an unresolved item and will be examined during the next inspection.

5. Document Control

TVA is developing procedures and instructions to ensure that documents (drawings, procedures, instructions, vendor records, manuals and project specifications) are controlled from the time of issue to final disposition.

OEDC QA Procedures QAP-3, 4, 5, 6 and 17 address corporate document control and DEC QC Procedure QCP-Q1 addresses control of site documents. The above procedures have not received final QA management approval; however, are being implemented as interim measures until final approval is obtained.

The document distributing area, document retention area (vault) and filing systems at Watts Bar appear to be adequate.

It is expected that the above document control procedures will be approved prior to the next inspection.

6. Instructions, Procedures and Drawings

OEDC-QAP-5.0 addressing instructions, procedures and drawings is being prepared by the QA staff in Knoxville. The inspector examined activities being performed at the site to confirm that documented instructions, procedures and drawings were being utilized. The inspector found the construction activities were being performed with authorized documentation.

7. Corrective Action

DEC-QCP-Q4, "Conditions Adverse to Quality and Corrective Action," is being utilized at the site. Forms are provided for reporting and correction of adverse conditions.

These forms are distributed to appropriate technical and management personnel for action. Followup of corrective action is performed by the QC and Record Group. Examination of records revealed no deficiencies.

8. Training Program

Watts Bar has a full time Training Officer (J. R. Nickell) at the site. Mr. Nickell is responsible for developing a training program for Watts Bar personnel.

Several training sessions on Quality Assurance have been presented to approximately 100 Watts Bar personnel. These were 1-1/2 hour sessions and were presented to familiarize supervision and craft personnel with the scope and content of TVA's Quality Assurance Program. Fifty-six weldors have attended a 90 minute training session on Welding Quality Control.

TVA stated that other training courses concerning basic welding metallurgy and non-destructive testing are being planned for the near future. From the evidence examined, TVA's training program has started and is being well received by the employees.

Outlines of previously held training sessions were given to RO for information. RO will continue to examine the overall training program and schedule for presentation during subsequent inspections.

9. Construction Scheduling

Watts Bar has set up and is utilizing the "Critical Path Method" (CPM) to schedule and keep track of construction activities.

Construction progress, items needing attention, general problem areas and man hours are computed on a monthly basis. Computer printout is evaluated and work items are rescheduled to eliminate current problems and to meet schedules.

10. ASME Code Stamp

Watts Bar is preparing a manual and is working towards an ASME Code Stamp. The ASME has conducted one survey and will perform another survey during the summer of 1974, at which time Watts Bar expects to receive their code stamp.

11. Documents Obtained by RO

The following TVA documents were given to the inspector for office use:

- a. Management Awareness Program Outline
- b. Table of Contents for QA Manual
- c. Welder Quality Control Training Session Outline
- d. Quality Assurance Training Session Outline
- e. Watts Bar Organization Charts

DETAILS II

Prepared by:

W. B. Swan
W. B. Swan, Reactor Inspector
Engineering Section
Facilities Construction Branch

Jan. 11, 1974

Date

Dates of Inspection: December 12-14, 1973

Reviewed by:

J. C. Bryant
J. C. Bryant, Senior Inspector
Engineering Section
Facilities Construction Branch

1/11/74

Date

All information in Details II applies equally to Units 1 and 2 except where information is identified with a specific reactor.

1. Individuals Contacted

Tennessee Valley Authority (TVA)

Site Personnel

- J. C. Killian - Project Manager
- T. B. Northern - Construction Engineer
- L. C. Northard - Unit Supervisor, Quality Control and Records
Engineering Unit
- H. S. Sheppard - Unit Supervisor, Civil (F) Field Engineering Unit
- J. C. Cofield - Unit Supervisor, Materials Engineering (C&S) Unit
- J. A. Lawhorn - Construction Inspector, Materials Engineering (C&S)
Unit
- R. L. Honeycutt - Civil Engineer, Civil (F) Field Engineering Unit
- K. A. Hasting - Mechanical Engineering Associate, Mechanical
Engineering Unit
- J. E. Daniel - Civil Engineer, Structural and Reinforcement Steel
Section of Civil (Field) Engineering Unit
- R. W. Noyes - Civil Engineer, Structural and Reinforcement Steel
Section of Civil (Field) Engineering Unit

Knoxville: Division of Engineering Design and Construction (DED)

- L. D. Weber - Chief, DED Quality Assurance Staff

2. Organizational Changes

Tennessee Valley Authority - DED, Knoxville

L. D. Weber has been appointed Chief of Quality Assurance Staff.

Tennessee Valley Authority - Watts Bar Site

Changes consisted of fleshing out the basic organizational groups. The inspectors were given four up-to-date charts showing: Project Organization; Construction Engineers Organization; Services Organization; and Construction Superintendents Organization.

3. Inspection of Concrete

This was the first construction inspection made at Watts Bar; so all items pertaining to the manufacture, placement and quality control of reinforced concrete which were inspectable were reviewed.

The licensee was found to have made two adjustments to meet unusual problems on this project. First, they received no bids for Type 2 cement because of the tight supply situation. They solved this problem by designing and qualifying all their concrete mixes to use Type 1 cement. Secondly, as noted in the PSAR, the site foundation structure is a shale which tends to deteriorate when exposed to atmospheric conditions. They were found to be meeting the problem by large scale use of 2,000 psi and 3,000 psi protective concrete. As installed, this concrete serves not only to protect and maintain the integrity of the foundation shale, but provides efficient footing for construction equipment and for forming for placement of structural reinforced concrete. It also expedites other construction activities.

The status of construction of safety critical concrete structures was investigated. Concrete had been placed for the base and lower walls of the control building. Forming and placement of additional walls were observed during this inspection. Protective concrete had been placed for the auxiliary building and installation of reinforcements and placement of the first concrete for the eight foot thick base of this building were observed. Excavation was continuing for the reactor buildings and some protective concrete had been placed on the sidewalls and base of the excavation. No structural concrete work had started.

No deficiencies were noted in forming, installation of reinforcements and embedments, placement of concrete or in the quality control of these operations.

The facilities and operational procedures were inspected at the aggregate storage yard, the batch plant, and the concrete testing laboratory. No problems impacting quality were revealed by this inspection. The batch plant equipment had been transferred to Watts Bar after being used for seven years at another facility.

The equipment was observed to be in good condition. An ice making plant was being installed to replace temporary ice storage and crushing facilities. Batching is controlled by a manually operated control panel and the weight of components in each batch are registered on a single eight foot wide chart. Batch tickets are made by transcribing readings and data from this chart. The roll chart is retained as a permanent record.

4. Review of Quality Control Records

The inspector sampled the licensee's records of quality control of components of concrete mixes, design mixes, freshly mixed concrete, and preparation and testing of concrete cylinders. Suppliers' certifications for cement and reinforcing steel were sampled as were the TVA inspector's reports made at the suppliers' shops.

The inspector questioned the lack of acceptability notations on summary records of tests made at the concrete laboratory. Such notations were found on the basic test reports from which the summary reports are generated. At the exit interview, the licensee stated that a corporate procedure has been generated for placing acceptability notations on summary records and that this procedure will be used at Watts Bar.

5. Calibration of Cement Scale at Batch Plant

The inspector, in reviewing the monthly report of concrete operations, noted on the continuing graph record of strength tests that the breaking strengths of concrete cylinders at the start of the graphs were considerably above required strengths and later results. He inquired if there had been a change in the cement. The laboratory representative said there had been no deterioration in cement quality and explained the changes in test results. He stated that during calibration of the cement scale at the batch plant, the calibrated weights are hung on the scale by a hanger which has considerable weight. When the hanger is removed, the scale indicator is returned to zero by turning two adjusting nuts on the scale arm. The scales company calibration technician had made the entire adjustment using only one nut which jammed the fulcrum operation and fed excess

cement into each mix. Excess cement, responsible for the unnecessarily high strengths on cylinders cast during September, was fed into batches mixed during this period. The plant had abruptly run out of cement.

An investigation revealed the reason and the scale was then correctly calibrated and adjusted. The test results of the corrected mixes then fell into the design acceptance ranges. This error did not negatively impact the concrete strengths. It is reported here as a possibly generic item for checking during the inspection of scales calibration in the future.

6. Site Bending of Reinforcing Steel

All of the reinforcing steel for structural concrete has been and will be cut and formed by licensee workers in a site shop. This bending is controlled as to size, length, and radii of bends by the structural drawings and by a set of standard TVA bending specification drawings. Visual inspection of the bent rebar is made by the iron workers during installation and by the field engineers before concrete placement.

The inspector asked if the field engineers routinely inspect the bars in the shop during and after bending to detect cracks from brittleness, inclusions or laminations in the bars. They stated that the engineers do not now inspect in the shop but that the workmen forming the bars occasionally are alerted to such flaws by differences in sound during cutting and bending of bars. The licensee stated that discussions would be held concerning the necessity for additional shop inspections and the assignment of responsibility.

7. Review of Construction Procedures and Quality Control Procedures

The licensee was found to be using the following General Construction Procedures for manufacturing and placing structural concrete:

G-2, "Plain and Reinforced Concrete" revised March 1973.

The revisions were reviewed.

G-8, "Forms for Reinforced Concrete"

G-30, "Fly Ash for Use as an Admixture in Concrete"

G-34, "Repair of Concrete"

The general TVA procedures are in use at other TVA nuclear sites and were familiar to the inspector. Only G-2 was reviewed during this inspection.

Quality control was being guided by:

"Quality Control Procedure for Concrete Placement and Documentation," September 21, 1973. This procedure was reviewed in detail since it has been tailored to Watts Bar requirements.

"Fabrication and Inspection of Miscellaneous Steel"

"Erection and Inspection of Structural Steel"

"Anchor Bolt Freeze Protection"

"Control of Measuring and Test Equipment"

"Quality Assurance Records." The recordkeeping procedures were found to have been adapted to Watts Bar requirements.

ASTM specifications and ACI Standards.

Acceptance limits for the various concrete mixes are set out on Table 8 in the mix design report dated October 31, 1973.

One exception to standard practice is used by TVA in the preparation of concrete test cylinders. A TVA designed drop table is used to compact the mix in the mold rather than rodding. The efficacy of this method is shown in a 1965 TVA technical report and use of the drop table has been stipulated in the PSAR.

8. Inspection of Warehousing Provisions

A site tour included inspection of warehouses. Twenty of the twenty-four warehouses have been completed. Work was underway on two warehouses requiring environmental control.

The buildings are large, modular, prefabricated steel structures with concrete slab floors. The site layout of these buildings and their storage assignments are designed to facilitate safe storage and ease of retrievability of stored items. Adequate height has been provided in the warehouses and in the various fabrication shops to permit full use of transport and materials handling equipment.

9. Inspection of Storage Yards and Materials Laydowns

The storage yards were found to be spacious, graded for drainage control, serviced by wide access roads, surfaced with crushed rock, and provided with materials supporting laydowns adequate for all except specialty items at this stage.

10. Provisions for Construction Expediting and Support of Quality Assurance

The inspector reviewed the site facilities, their layout, and plans for integrated utilization in relation to their capability toward expediting of construction and effective support of QA/QC. Some of the inspected facilities indicating sound planning toward both objectives are:

- a. High quality spacious offices for project management, supervision, engineering personnel, drawings, and quality assurance planning and files, centrally located for access to all operations.
- b. High grade shops for fabrication operations and equipment maintenance with high bays where required for bridge cranes and portable cranes and transport equipment.
- c. Broad, well marked and paved access road from highway to work areas.
- d. High grade warehouses with concrete floors with contiguous storage yards well surfaced; these facilities laid out to provide ease in storage and retrievability of materials and equipment.
- e. New, ample construction equipment.
- f. Improved communications through use of intercom radios and paging units carried by key personnel. The site telephone system had not been adequately implemented at this inspection.
- g. Access by rail, highway, and river barges.
- h. Separate security stations for visitors and construction personnel and materials receiving.
- i. Ample and high useability factor of site area.
- j. A large, well equipped concrete and soils testing laboratory.