



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

Report Nos.: 50-518/78-8, 50-519/78-8, 50-520/78-8 and 50-521/78-8

Docket Nos.: 50-518, 50-519, 50-520 and 50-521

License Nos.: CPPR-150, CPPR-151, CPPR-152 and CPPR-153

Categories: A2, A2, A2 and A2

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

Facility Name: Hartsville Nuclear Plants A and B

Inspection at: Hartsville, Tennessee

Inspection conducted: August 15-18, 23-24 and 28-31, 1978

Inspectors: J. K. Rausch
W. B. Swan
J. C. Bryant

Approved by: QR Herdt
A. R. Herdt, Chief
Projects Section
Reactor Construction and Engineering Support Branch

10/4/78
Date

Inspection Summary

Inspection on August 15-18, 23-24 and 28-31, 1978 (Report Nos.: 50-518/78-8, 50-519/78-8, 50-520/78-8 and 50-521/78-8)

Areas Inspected: Routine, unannounced inspection of QA program, steel containment plate weld procedures, Category I concrete work activities and records and storage vaults for permanent records. The inspection involved 88 inspector hours on site by two NRC inspectors.

Results: No items of noncompliance or deviations were identified.

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and 50-521/78-8

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DETAILS

Prepared by: AR Herdt
in J. K. Rausch, Principal Inspector
Projects Section
Reactor Construction and Engineering
Support Branch

9/26/78
Date

Dates of Inspection: August 16-18, 1978

Reviewed by: AR Herdt
A. R. Herdt, Chief
Projects Section
Reactor Construction and Engineering
Support Branch

9/26/78
Date

1. Persons Contacted

Tennessee Valley Authority (TVA)

- R. T. Hathcote, Project Manager
- *G. A. Gonsalves, Supervisor, Site QA Unit
- H. S. Sheppard, Assistant Construction Engineering Plant B
- B. A. Gant, Construction Engineer Plant A
- *L. H. Jackson, Assistant Construction Engineer, Plant A (QC)
- *W. O. Brown, Assistant Construction Engineer, Plant A (Projects)

*Denotes those present at the exit interview.

2. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Items 518/78-04-02, 519/78-04-02, 520/78-04-02 and 521/78-04-02; Revision to C.E.P. 18.01: Hartsville Procedure C.E.P. 18.01 has been revised by the licensee to include establishing a completion date for corrective action on a QA audit deficiency.

(Open) Unresolved Items 518/78-03-02, 519/78-03-02, 520-78-03-02 and 521/78-03-02; Part 21 Implementation Instructions: A Procedure to insure that there is sufficient management control to implement 10 CFR 21 has been drafted by the licensee. This item will remain open until the procedure is approved and implemented.

3. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item identified during this inspection is discussed in paragraphs 5 and 6.

4. Independent Inspection Effort

The inspector examined various areas of Plants A and B to observe construction work and related activities in progress, to inspect the general state of cleanliness and housekeeping, and to examine the inplace storage condition of mechanical and electrical equipment.

No items of noncompliance or deviations were identified.

5. Processing of Nonconformance Records (NCRs), Plant A-1

During an examination of the documents stored in the vault the inspector noted that three NCRs on file were not completed. Specifically the "recommended action block" did not show that an evaluation had been made of the condition and that management approved the course of action. One of three NCRs was five weeks old; the other two were one week old each. Further discussion with personnel revealed that two of the three NCRs had been completed and were being distributed for use. The inspector examined the NCRs and had no further questions about these two. However, the third one which had been initiated July 10, 1978 had not been processed. The inspector advised the licensee that two areas of concern existed. The first being that the incomplete NCRs should be held in a suspense file so that they could not be confused with completed NCRs and second that an NCR must not be delayed once it is initiated. Prior to the time the inspector left the site the licensee advised that procedures had been drafted to correct the condition. This will be considered an unresolved item pending approval of satisfactory procedures. This item is identified as 518/78-08-01, Expediting and Filing NCRs.

No items of noncompliance or deviations were identified.

6. Altered Cadweld Splices, Plants A1, B1, A2 and B2

During the IE:II inspectors review of the NCR documentation it was noted that NCR B-8 for the B1 plant had been prepared to document and provide corrective action for altered cadwelds. A TVA quality control inspector noted that filler metal other than Cadweld filler metal was used on a Cadweld splice. TVA further investigated in the immediate area and found additional splices with the foreign material applied.

Sectioning of the splices revealed that reinforcing steel tie wire had been used on the uppermost end of splices made in a vertical position. A reinspection was made by TVA on 100% of the vertical cadweld splices (approximately 3000) a total of 42 altered splices were found. TVA has identified the crew members who worked on the altered splices.

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The information obtained is not conclusive since it was found that ten different crews on both the first and third shifts were involved. TVA is investigating the condition further and questioning workers and foremen to determine the extent of the practice. Other action committed to by TVA is to update the NCRs, prepare written report on their investigation and to send revised NCRs to Knoxville for a 10 CFR 50.55(e) evaluation. This item will be carried as unresolved item pending satisfactory resolution of this condition by TVA. It is identified as 518/519/520/521/78-08-02, Altered Cadweld Splices.

No items of noncompliance or deviations were identified.

7. Licensee Identified Items (50.55(e))

Prior to this inspection, the licensee identified the following item under the terms of 10 CFR 50.55(e):

(Open) Items 518/520/78-08-03, High Pressure Core Spray System Control Switchgear Wiring Discrepancy: A breakdown in the QA Program at Morrison-Knudson permitted various wiring discrepancies between the actual switchgear wiring and the latest revisions of the wiring diagrams. The discrepancy was found at the site. TVA is investigating. A written report is due September 11, 1978.

8. IE Bulletins

(Closed) IEB 78-06 Defective Culter-Hammer, Type M Relays With DC Coils

TVA has advised by letter dated July 31, 1978, that no subject relays are used or scheduled to be used in safety-related systems for Hartsville Nuclear Plants. RII has no further questions regarding this matter.

9. Exit Interview

A management interview was held with Mr. W. O. Brown, Assistant Construction Engineer, at the conclusion of the inspection. He was apprised of the scope and findings of the inspection which included: record storage, base mat pours, and altered rebar splices.

DETAILS II

Prepared by:

W. B. Swan
W. B. Swan, Civil Engineer
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

10/3/78
Date

Dates of Inspection: August 15-18; 23-24 and 28-31, 1978

Reviewed by:

J. C. Bryant
J. C. Bryant, Chief
Engineering Support Section No. 1
Reactor Construction and Engineering
Support Branch

10/5/78
Date

1. Persons Contacted

a. Tennessee Valley Authority (TVA)

- *R. T. Hathcote, Project Manager
- *G. A. Conzaves, Supervisor, Site QA Unit
- B. A. Gant, Construction Engineer, Plant A
- *W. T. Quinn, Construction Engineering, Plant B
- *W. R. Brown, Assistant Construction Engineer, Plant A
(Replaces B. Gant)
- M. N. Sawyer, Assistant Construction Engineer, Plant A
- *L. H. Jackson, Assistant Construction Engineer, Plant A, QC
- *W. O. Brown, Assistant Construction Engineer, Plant B,
Engineering Services
- *H. S. Sheppard, Assistant Construction Engineer, Plant B, QC
- *B. F. Huffaker, Supervisor, Materials and Civil QC, Plant B
- W. W. Davis, Materials and Civil QC, Plant A
- H. G. Denning, Materials and Civil QC, Plant B
- *J. W. Davenport, Supervisor, Materials and Civil QC, Plant A
- S. P. Stagnolia, Supervisor, Welding QC, Plant A
- G. T. England, Supervisor, Document Control, Plant A

b. Contractor Organizations

1. The Hartford Steam Boiler Inspection and Insurance Co.
(Hartford)

R. C. Schlamp, Authorized ASME Code Inspector

2. General Electric Company (GE)

W. E. Widener, Resident Representative

*Denotes those present at exit interviews on August 18 and/or 31, 1978.

2. Licensee Actions on Previous Inspection Findings

a. (Closed) IFI 518/78-06-02 Structural Steel Containment Vessel for Plant A Reactor Building, Unit 1

Transition section steel plates shipped unfinished by Bristol Steel and Iron Works (Bristol) are being welded by TVA to maintain schedule.

The inspector reviewed the licensee's work package D007-M2 Addendum 1, Plant A. This work package covers installation of annular ring plates on 7-1Pl shell plates. Six others had been completed at Bristol shop. Cladding on the assembled plates will be installed under a separate work package after qualification of the package procedures.

The reviewed package was found to designate already approved weld procedures and adequate for assembly welding.

b. (Open) 10 CFR 50.55(e) Item 518 and 519/78-06-01 Defective Welds on Sump Liners

NCR HNP-A-014 describes defects in welds around reinforcing plates added to the sump liners by the fabricator, INKYCO, for the sump motor braces.

The recommended disposition is two fold: (1) for sumps already embedded in concrete, 1/4" plate giving a two-inch overlap of the defective area will be welded to the liner plate; and (2) exposed poor quality welds are to be ground to remove imperfections, repair welded and ground smooth for liquid penetrant inspection.

Construction cribbing and storm water had prevented the licensee from implementing corrective action by the end of this inspection period.

3. Unresolved Items

No new unresolved items were identified by the inspector during this inspection.

The inspector did, however, participate in the discussions and inspection of cadwelds following disclosure by the licensee of slugging of voids in some vertical cadwelds in the base mats of Units A-1 and B-1. This matter is discussed in greater detail in Details I.

On August 31, 1978, the licensee informed this inspector that all vertical cadwelds in the basemats of Units B-1 and A-1 had been reinspected and that all cadwelds showing evidence of "slugging" of voids in the welds had been removed and replaced.

4. Independent Inspection Effort

Visual inspections were made in the following areas: installation of rebar, cadwelds and embedments for Category 1 reinforced concrete for Units A-2 and B-2 and peripheral structures such as the auxiliary buildings and radwaste buildings; cleaning of the rock excavation for B-1 spray pond and compaction of earth fill between A-2 and B-1 spray ponds; foundation preparations for cooling towers for all units; cleaning and forming preparations for concrete placements in the fuel buildings and auxiliary buildings for Plants A and B; excavations and initial concrete placements for C. C. W. makeup intake channel and pumping station; fabrication of the first ring of Unit A-1 reactor containment wall and reactor pressure vessel steel support vessel; weekly progress reports and analysis; Nelson stud installation on containment liner base rings in Unit A-1; and document control room conditions for Plant A.

Observation of work in progress and inspection of completed work in those areas disclosed no items of noncompliance.

5. Containment (Structural Concrete I) - Observation of Work and Work Activities Unit A-1

During this follow-on inspection, the inspector observed work on the containment base mat.

Acceptance criteria for reinforced concrete are set out in C. F. Braun and Company specification 300-01 "Concrete, TVA STRIDE" Revision 5. Implementation for the operations observed is by TVA Quality Control Instruction C-201 Concrete, Concrete Placement, Revision 4; C-207 Reinforcement Steel Placement, Revision 1; C-401 Concrete-Cadweld Inspection, Revision 1, and C. E. P. 9.02 Concrete Placement Control, Revision 2.

The inspector substituted observation of operations for Category I placement AW-2A, 4B,6 for the east one-half of the base mat for Plant A radwaste building. The inspector observed: mixing, testing, transport and placement of concrete mixes; finishing and curing. Calibration currency was verified for batch plant scales and laboratory equipment.

The recorded test data for slump, air content, concrete temperature and air temperature were reviewed on a summary tally sheet for cylinder sets numbers 1165, 1166, 1167, 1168, 1169, and 10085. An NCR was written for excessive slump (4 inches versus 2-1/2 inches) for set 1166 and one was written on concrete mix temperature (69°F versus 65°F) for set 1167. The batches had already been placed before the test data was available. The occasional use of a batch with excessive slump is allowed under NOTE (2) of table on page 19 of Specification 300-01. Confirmation of acceptability is confirmed when 3-day and 7-day compressive strengths are in the acceptable range.

The placement authorization card was properly executed approving forms, rebar and other embedments, footing preparation and all specified inspections. Delivery was by hopper truck on a short run so principal testing of batches was done at the batch plants and laboratories. Handling was done through two steel pump lines and a crane. An adequate crew and an inspector were used at each placement point.

After surface finishing, plastic membranes were used for curing. Heavy rains which followed provided ponding throughout the required curing period.

Aggregate and cement storage, inspection and testing were acceptable. Temperature control of the batches was obtained by using ice. Materials proportioning, batch records, and batching inspection were acceptable.

In the operations observed no items of noncompliance or deficiencies were identified.

6. Containment (Structural Concrete I) - Review of Quality Records
Unit A-1 Basemat

The quality related records for three previously completed placements in the A-1 basemat were reviewed: Pour No. AIR-1A, 1852 cubic yards on 12/7/77, Pour No. AIR-1B, 865 cubic yards on February 24, 1978 and Pour No. AIR-1C, 2638 cubic yards on 7/28/78.

The records reviewed included the pour authorizations which approved location preparation and preplacement inspections; batch proportioning, inspection, testing, delivery and placement, inspector qualifications; rebar splicing including qualifications of process and crew, inspection,

testing of samples, qualifications of inspection personnel, and an audit of rebar splicing activities; records confirming that component materials met specification requirement and that inspection records met requirements for control of material receipt, handling, storage and identification; batch plant certification, production, calibrations, inspections and qualifications of QC personnel; and NCR processing.

Acceptance criteria for quality records are described in Specification 300-Q1, Revision 5, CONCRETE, TVA STRIDE, in the PSAR, and by construction drawing notes.

Implementation is through TVA construction procedures and quality control instructions and forms attached thereto. These include: construction engineering procedures 2.10, 3.12, 7.02, 9.02 and 15.03; and Civil Quality Control Instructions C-201 through C-212, C-401, C-402 and the ASTM Standards incorporated in these documents.

Sampling of the records gave assurance that concrete of adequate quality was obtained. For example, compressive testing of 90-day cylinders for the first placement yielded between 3198 psi and 4351 psi, an average of 3668 psi, where 3,000 psi is required. At 180 days the cylinders yielded strengths between 3926 and 5235 psi. For the second placement made February 24 and 25, 1978, the 90-day cylinders had strengths between 3643 psi and 4245 psi, and averaged 3848 psi.

For the third placement, one batch tested low (1.0%) entrained air and four batches tested high in slump (3", 3", 3.8" and 4" versus 2-1/2"). The QCIR and NCRs were cleared by results of three-day compressive strength test results:

Batch No. 1106; 4" slump, 1.0% air; Average 1,110 psi	
Batch No. 1107; 3" slump	Average 1,061 psi
Batch No. 1110; 3.8" slump	Average 990 psi
Batch No. 1112; 3" slump	Average 1061 psi.

In review of the quality records no items of noncompliance or deviations were identified.

7. Containment (Structural Concrete I) - Observation of Work and Work Activities Unit B-1

The inspector observed activities preparatory to placement BIR-1C, the third placement in the basemat of Unit B-1 reactor building. Volume was estimated at approximately 2,500 cubic yards but the placement was terminated by torrential rains after approximately 2,000 cubic yards had been placed. The inspector observed placement work and related activities including batching, transporting, testing and inspection.

Acceptance criteria for these operations are prescribed in the PSAR and in the controlling specification C. F. Braun and Company Specification 300-01, "CONCRETE, TVA STRIDE" and by construction drawing notes.

These requirements are implemented by TVA construction engineering procedures 2.10, 2.12, 7.02, 9.02 and 15.03; and by Civil Quality Control Instructions C-201 through C-212, C-401, C-402, and testing instructions in the ASTM Standards referenced in these documents.

Some of the preliminary activities such as rebar placement and cadweld splicing had been completed. Their adequacy was deduced from visual inspection of the completed work, approvals on the pour authorization document, by review of TVA site QA Unit Audit No. HB-C-78-02 performed April 3-28, 1978, to verify implementation of CEP-9.02 R2, QCI C-201 R2 and QCI 2.02 R5 for placement B1-RB-1a, first placement in the B-1 basemat; and by review of Audit HB-C-78-01, performed March 6, to April 4, 1978, for Plant B cadwelding to verify implementation of cadwelding program as given in CEP 2.12 R2, QCI-C-401 R1, and QCI C-402 R2. The audit findings were clear.

In reviewing QCI C-204 form "Sieve Analysis of Concrete Aggregates" for aggregate being used in the placement mixes, the inspector noted that the 3/8" to No. 4 fraction was running coarse. The screen should pass 90% to 100% in this range. The laboratory records show that between 61.0% and 87.4% were passing. Acceptance of this variation is within the discretion of the materials engineer. Nevertheless, a request had been made to change screens at the quarry. In the meantime, seven-day break results have confirmed that mixes using this coarser fraction are within the required compressive strength range.

The Plant B concrete laboratory log was reviewed for compressive test results for 3-day, 7-day, 28-day, 90-day and 180-day (optional) breaks. All results were satisfactory except for one cylinder which yielded 2,688 psi versus the specified 3,000 psi at the 90-day break. Another cylinder from the same set will be tested at 180 days. The overall results are acceptable because a failure in this range is ignored if the average of five successive tests meets the 3,000 psi target.

Transport of the mix between the hopper trucks and the placement was by Liebherr and Manitowoc cranes and by two pairs of steel pump lines. Continuous inspection was provided at each deposition point.

The required testing and cylinder casting at 200 cubic yard intervals were supplemented by field testing at approximately 50 cubic yard intervals to insure uniformity of product.

Despite extensive efforts by TVA to protect the surface of newly placed concrete from heavy rainfall and invading streams of water, some leaching of cement from the surface occurred. Another large placement goes over this layer. TVA procedures call for roughing of the surface and removal of all laitance and damaged concrete. The inspector found that for this placement all requirements were adequately met in the areas of placement preparation; concrete manufacturing and testing; transport and handling; placement and protection.

In the activities examined in these areas, no items of noncompliance or deficiencies were identified.

8. Plant A Document Control Rooms

During examination of records the inspector was told that efforts were being exerted by the Document Control Unit to improve the security of the records in the main processing area by a method of complete closure of the big issue window and the hallway; to obtain a dehumidifier or insure continuity of air conditioning in the main records processing area in order to stop mildew damage to records and manuals; and to accelerate identification of files in the records vaults. Progress of improvement efforts will be followed during future inspections.

9. Exit Interviews

The inspector participated in an exit interview with Mr. R. T. Hathcote, site manager, and members of the site staffs on August 18, 1978. This inspector outlined the areas covered by his portion of the inspection and discussed his findings in the areas of concrete, CFR 50.55(e) items previously identified by the licensee, independent inspection effort on pertinent site work, job status, and Plant A document control room conditions. He stated that in the areas examined no items of noncompliance were identified and there was no new unresolved item.

This inspector returned to inspect concrete placements in the following two weeks and held an additional exit interview with Mr. R. T. Hathcote, site manager and members of the site staffs on August 31, 1978. He gave the scope of the follow-on inspection and discussed his findings on the placement of concrete in the Plant A radwaste structure and in B-1 Unit basemat; and his review of records for the first three placements in the A-1 basemat. He stated that in the work activities observed and the records reviewed no items of noncompliance had been identified and no new unresolved items had been disclosed.