

U. S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPERATIONS

REGION I

RO Inspection Report No.: 50-320/72-07

Docket No.: 50-320

Licensee: Metropolitan Edison Company

License No.: CPPR-66

Three Mile Island Unit No. 2

Priority: _____

P. O. Box 542

Reading, Pennsylvania

Category: A

Location: Middletown, Pennsylvania

Type of Licensee: PWR 831 MWe (B&W)

Type of Inspection: Routine, unannounced

Dates of Inspection: November 1-3, 1972

Dates of Previous Inspection: September 26-27, 1972

Principal Inspector: *S. A. Folsom*

S. A. Folsom, Reactor Inspector

11/22/72
Date

Reporting Inspectors: *A. A. Varela*

A. A. Varela, Reactor Inspector, Construction

11/22/72
Date

Date

Other Accompanying Personnel: None

Reviewed By: *J. H. Tillou*

J. H. Tillou, Acting Senior Reactor Inspector

11-22-72
Date

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SUMMARY OF FINDINGS

Enforcement Action

- A. Containment building accepted Cadweld splices found not to meet the acceptance standards established in procedures. (Management Interview paragraph A and Reports Details paragraph 4)
- B. Contradictory requirements in QC procedures for qualification of Cadweld operators. (Management Interview paragraph D and Report Details paragraph 5)

Licensee Action on Previously Identified Enforcement Matters

Not inspected

Design Changes

None

Unusual Occurrences

None

Other Significant Findings

A. Current Findings

None

B. Status of Previously Reported Unresolved Items

Not inspected

Management Interview

The management interview was held on November 3, 1972 with licensee and contractor personnel.

Personnel Attending

GPUSC

Mr. M. J. Stromberg, Site QA Supervisor
Mr. H. I. Stewart, Assistant Construction Manager
Mr. W. S. Shepherd, Project Engineer
Mr. J. H. Wright, Civil Engineer
Mr. T. Hreczuch, Mechanical Engineer

Mr. J. J. Connelly, Site QA Specialist
Mr. L. E. Lundstrom, Site QA Specialist
Mr. D. C. Touch, Project Engineer (GPU/GAI)

UE&C

Mr. R. N. Moyer, Site QC Supervisor
Mr. D. C. Lambert, Assistant Site QC Supervisor
Mr. J. H. Malvin, QC Engineer, Structural
Mr. V. E. Cichocki, General Superintendent
Mr. N. A. Vitale, Administrative Assistant to QC Supervisor
Mr. R. L. Hawkins, Construction Engineer, Civil QC Problems

The following items were discussed:

- A. Some accepted Cadweld splices did not meet the acceptance criteria in the applicable QC procedure No. QC-1-2. (Report Details, paragraph 4)
- B. Cadweld operator qualification requirements are contradictory in QC-1-2 procedure. (Report Details, paragraph 5)
- C. Observation of work performance in Class I concrete placement - The inspector reported he found no apparent deficiencies in Class I concrete placement on November 1, 1972 on the Auxiliary Building's East Mezzanine walls and slab. The licensee acknowledged these observations. (Report Details, paragraph 2)
- D. Installation of tendon ducts - The inspector expressed his concern that the procedure for Erection of Tendon Duct System was perhaps inadequate to prevent mislocation of tendon ducts and urged the licensee to use every precaution to obtain correct alignment on curved vertical ducts. The licensee expressed appreciation for the inspector's remarks. (Report Details, paragraph 6)

DETAILS

1. Persons Contacted

GPUSC

Mr. M. J. Stromberg, Site QA Supervisor
Mr. H. I. Stewart, Assistant Construction Manager
Mr. J. H. Wright, Civil Engineer
Mr. J. J. Connelly, Site QA Specialist
Mr. W. S. Shepherd, Project Engineer
Mr. T. Hreczuch, Mechanical Engineer
Mr. L. E. Lundstrom, Site QA Specialist
Mr. D. C. Touch, Project Engineer (GPU/GAI)
Mr. R. Neidig, Assistant Civil Engineer

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Mr. R. N. Moyer, Site QC Supervisor
Mr. D. C. Lambert, Assistant Site QC Supervisor
Mr. J. H. Malvin, QC Engineer, Structural
Mr. V. E. Cichocki, General Superintendent
Mr. N. A. Vitale, Administrative Assistant to QC Supervisor
Mr. R. L. Hawkins, Construction Engineer, Civil QC Problems
Mr. R. Delarm, Area Supervisor
Mr. D. Wells, QC Engineer, Mechanical
Mr. F. Mallick, QC Inspector, Civil/Structural

PTL

Mr. H. Ruffner, Laboratory Technician
Mr. W. Gaskin, Batch Plant Inspector
Mr. E. Swaby, Batch Plant Manager (for National Mobile Co.)

2. Inspection of Class I Concrete Placement

a. On November 1, 1972 work performance was observed and evaluated against ACI 301-66 standards and the job QC procedures in Class I concrete placement for the Auxiliary Building East Mezzanine walls and slab in these items:

- (1) Forms composed of steel framing of treated plywood appeared to be strong, tight and clean.
- (2) The rebar and other embedments were observed to be clean, properly placed, and sturdily secured.

- (3) Preplacement QC inspection records of October 31, 1972 were audited and found to have been checked for cleanliness of forms, rebar, embedments, and the surface preparation of abutting concrete.
- (4) The requirement of proper concrete mix design was traced through engineering to construction and through the batch plant to delivery and found to be in accordance with construction drawings.
- (5) Concrete tests and records were verified to be in accordance with QC requirement for slump, strength, and air entrainment.
- (6) Concrete placement from truck delivery of the completely batch plant mixed concrete, using a two cubic yard bucket, crane lifted, appeared properly controlled, and the crew size and placement technique observed appeared without deficiency.
- (7) The QC inspections by the contractor were observed to properly control the work and documentary records of same appeared to be as required by QC procedures.
- (8) Rebars on the Auxiliary Building East Mezzanine wall and slab appeared to be properly overlap spliced; no bars over #8 were used. (Cadmold splicing of larger size bars were inspected on the Containment Building wall at the Personnel Hatch and found not to meet acceptance standards of QC-1-2 procedure.*
- (9) Aggregate storage was found satisfactory as to separation of sizes, moisture, and temperature control, and proper height and pile maintenance by front end loader prevented segregation.
- (10) Cement and admixture storage were found adequate to avoid deterioration or contamination in storage.
- (11) Batch plant operation by National Mobile Company was observed to assure correct design mix proportion of ingredients. The control by PTL appeared to fulfill all QC requirements.
- (12) All QC procedures, except in Cadmold splicing as noted above, appeared to be properly implemented.

*See Details, paragraph 4)

3. Review of Prestressed Concrete Quality Control System

a. The QC program for prestressed concrete components is implemented by UE&C Civil Structural Procedures and requirements are established by B and R specifications and contract drawings. The QC system was reviewed for implementation of the QA program in these items:

- (1) Mill certificates, check analyses and manufacturing specifications on tendons, sheaths and anchorages are specified, as required, by appropriate references to ASTM specifications. The tendons are specified to be seven wire strands, uncoated, stress relieved steel strand conforming to ASTM A-416 requirements, and test samples of tendon steel are specified to be taken from both ends of every reel of strand or wire as delivered from the mill for test of compliance to physical requirements.
- (2) Grout material for bonding of tendons is identified to be in accordance with PCMAC-WCRSI, Recommended Practice for Grouting Post Tensioning Tendons and ACI 301 with additional requirements for cement, water and admixture.
- (3) Packaging and protection of tendons during shipment is specified and requirements are established for an approved vapor phase inhibitor on steel wire reels with waterproof covering, and procedures for handling during shipment require special protection.
- (4) Receipt inspection calls for certified copies of chemical and physical test reports for all materials upon delivery of each shipment.
- (5) Cement for grout is specified to meet ASTM C-150, Type II requirements, and the chloride content of cement from five suppliers will be tested and that with the least chloride content will be selected. Water chloride, nitrate and sulphide content is specified.
- (6) Physical and environmental protection requirements during storage of tendons, ducts and hardware are defined. Tendons and anchorage materials are required to be offsite stored in an enclosed heated dry space and tendons shall be transferred from carrier direct to placement upon arrival at the jobsite.
- (7) Anchorages for strand tendons has been selected from one of three types allowed by B and R specification No. 2555-30. It is the split cone 3 strand gripper, bearing into conical holes machined in bearing plate, designated "S/H 54-5 Wedge Anchorage System."

- (8) Tendon ducts and anchorages positioning is defined in the procedures to be the locations preset by field survey and verified by QC as required in Field Inspection Check List.
- b. Material records and certificates were reviewed and found to comply with specifications as required by job QC procedures for the following items:
 - (1) Embedded bearing plates per ASTM A-516, Grade 70.
 - (2) Trumpets per ASTM A-135, Grade A electric welded.
 - (3) Trumpet adapters, cold drawn, killed, per ASTM A-620.
 - (4) Trumpet piping, hot dipped galvanizing per ASTM A-386.
4. Cadweld Splices Found Not to Meet QC Procedure Acceptance Standard After Being Accepted by QC

On November 1, 1972 the RO inspector, accompanied by licensee and contractor representatives, inspected Cadweld splices that were accepted by QC on area "Pour Z" being prepared for placement on the Containment building exterior wall under the Personnel Hatch. Cadweld No. 157 on No. 18 bar at 45° on vertical hoop, made by operator No. 36 was found to have a void in the filler metal at upper end in excess of the 3.00 square inches allowed by procedure QC-1-2. The RO inspector identified another hoop splice, Cadweld No. 110 on No. 11 bar at 45° by operator No. 43 that appeared marginal for filler metal, informed the licensee and contractor that he questioned its acceptance and stated that many splices that had asbestos packing still in the sleeve appeared not to have been inspected.

On November 2, 1972, a.m., the RO inspector returned to above area, measured filler metal void on splice No. 110 and found it had a void in excess of the 1.53 square inches allowed by the procedure. The inspector found no indication that QC had reinspected this splice after he had questioned its acceptance on the previous day. The RO inspector informed the licensee of his observation and added that the presence of asbestos packing on at least one end of many splices raised a doubt that they had ever been inspected by QC. The RO inspector was later informed that contractor's Site QC Supervisor, by memo, directed construction to remove and replace splices No. 141 and No. 110 because they did not meet acceptance standards of QC-1-2, and to properly clean and otherwise prepare all Cadwelds for QC inspection.

On November 3, 1972, the RO inspector returned again to the above area accompanied by licensee personnel to inspect remaining vertical hoop Cadweld splices on 45° and observed that splice No. 141 on No. 18 rebar, made

by operator No. 36 did not meet the QC procedure requirements for: (a) evidence of filler metal between sleeve and bar for the full 360°; and (b) filler metal void shall not exceed limit of 3.00 square inches.

The inspector reviewed the qualifications of operator No. 36 and observed that he was qualified as required by QC-1-2, Appendix B, Section 3.e.1.

Subsequent to the site inspection, in a Telcon, the licensee informed the inspector that all Cadweld splices in Pour Z were reinspected, that No. 141 was removed and replaced, and it was made the subject of an engineering study by Burns and Roe. As a consequence of this study, changes were being made to QC-1-2 to reduce allowable void area in hoop splices.

5. Contradictions in QC Procedure QC-1-2 on Qualifications for Cadweld Operators

Approved Procedure QC-1-2, Appendix B, dated July 12, 1972 in Qualification of Cadweld Operators, section 3.e.1, states, "Cadweld splicing operators will be qualified by preparing a test joint for each bar size and position he will be required to splice." Section 3.c.3 states, "A minimum of six test splices of each bar size to be used shall be made and tested and the results reported. At least three shall be with bars in each position required." This contradiction was brought to the licensee's attention by the inspector after the management interview.

Subsequent to the site inspection, in a Telcon, the licensee informed the inspector that section 3.e.1 requirement is correct and that section 3.e.3 is incorrectly located under Qualification of Cadweld Operators, the latter refers to Cadweld Procedures only. The licensee added that the procedure will be corrected.

6. Precaution on Tendon Duct Location

The inspector reviewed procedure CCP-1-2, Erection of Tendon Duct System and found it incomplete, but those sections applicable to work undertaken appeared to be without deficiency. However, because of a problem in vertical tendon duct alignment at another facility under construction, the inspector informed the licensee at the management interview that precautions should be taken during installation to assure that correct alignment on all vertical ducts is obtained and that the alignment is unchanged by concrete placement.

The contractor stated that the procedure requires:

- a. An inspection record detailing the results of visual inspections before

concrete placement.

- b. A history of as-built locations of all duct lines.
- c. Differences from design locations shall be calculated and the amount noted.
- d. QC conduct surveillance inspections prior to releasing the concrete pour.
- e. QC to review as-built records of duct location, alignment and duct splice joint prior to releasing the concrete pour.