

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

NOTICE
18 OCT 1978
AS OF _____
REGION I HAS NOT OBTAINED PROPRIETARY
CLEARANCE IN ACCORDANCE WITH 10 CFR 2790

Report No. 50-363/78-12

Docket No. 50-363

License No. CPPR-96 Priority -- Category A

Licensee: Jersey Central Power and Light Company

210 Cherry Hill Road

Parsippany, New Jersey 07054

Facility Name: Forked River Nuclear Station, Unit 1

Inspection at: Forked River, New Jersey

Inspection conducted: September 12-15, 1978

Inspectors: *(Signature)*
A. A. Varela, Reactor Inspector

October 2, 1978
date signed

date signed

date signed

Approved by: *(Signature)*
S. D. Ebnetter, Chief, Engineering Support
Section No. 2, RC&ES Branch

10/3/78
date signed

Inspection Summary:

Inspection on September 12-15, 1978 (Report No. 50-363/78-12)

Areas Inspected: Routine, unannounced inspection by a regional based inspector of reinforcing steel installation and cadweld splicing for the containment basemat. Concrete mixing, delivery, testing, placement, finishing and curing for containment basemat was observed. The inspector also observed backfill placement, compaction and testing, and reviewed records on maintenance of de-watering, pressure relief and slope stability of the excavation. A site tour inspection was performed and previously identified unresolved items were reviewed. The inspection involved 30 hours onsite by one NRC regional based inspector.

Results: Of the six areas inspected, one item of noncompliance was identified in curing of concrete.

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DETAILS

1. Persons Contacted

General Public Utilities Service Corporation (GPU)

J. J. Barton, Project Site Manager
J. W. Davis, Resident Civil Engineer
*R. F. Fenti, Senior Site QA Auditor
J. W. Griest, Project Construction Manager
*S. Levin, Supervisor Site Engineering
*J. C. Thompson, Site Quality Control Supervisor
J. E. Wright, Site Quality Assurance Manager

Stone and Webster Engineering Corporation (S&W)

J. Adachi, Concrete Testing Site Manager (PTL)
L. Brown, Construction Superintendent
S. Deyo, Construction Engineer
W. G. Dick, Area Superintendent
S. D. Morris, Quality Control Engineer
G. Noons, Area Engineer
*B. Officer, Assistant Superintendent of Construction
*K. Platte, Resident Engineer
F. Puffer, Quality Control Engineer
A. Pinter, Quality Control Engineer
*R. L. Wagner, Superintendent of Construction

Morrison-Knudsen (M-K)

R. Barnes, Quality Control Engineer
R. Colasardo, Soil Test Engineer, (U.S. Testing Company)
N. Corbi, Reinforcing Steel Superintendent
L. Grandpre, Construction Superintendent
H. Haney, Area Superintendent
*D. Kivisto, Assistant Project Manager
D. Richards, Quality Control Engineer
*R. Stauber, Site Quality Assurance Manager
D. Sleeper, Quality Control Cadwe? Inspector

Burns and Roe Inc. (B&R)

T. Hayes, Geotechnical Engineer
S. Lazorchak, Site Field Engineer
E. Zisman, Senior Geotechnical Engineer

Eastern Shore Transit Mix (EST)

R. Johnson, Quality Control Manager
V. Nagee, Quality Control Engineer
F. DeCessaro, Batch Plant Operator
A. Vendrasco, Vice President

*denotes those present at the exit interview.

The inspector also interviewed other licensee and contractor employees during the inspection, including quality control and construction crafts.

2. Plant Tour

The inspector made a tour of the construction site to observe work activities in progress. The inspector examined work items for any obvious defects or noncompliance with regulatory requirements and for evidence of quality control of the work. Specific activities observed by the inspector included installation and cadwelding of reinforcing steel for the reactor well basemat, placing, compacting and testing of structural backfill, mixing, transporting, testing and placing concrete for the containment basemat and laboratory tensile tests on vertical #18 cadweld splices to qualify operators.

As identified in Paragraph 4 concrete placement practices observed, at start of work on the containment basemat pour, LSK 104-B appearing as poor practice was corrected. Paragraph 5 identifies a noncompliance in post placement concrete curing. Except for these items, other construction site work activities were observed to be without items of noncompliance.

3. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (363/78-08-02): Procedure on mechanical splicing of rebar requires corrections for clarity and specificity. Procedure CP-12-FR on mechanical splicing of reinforcing steel bars was revised by M-K June 21, 1978 and revision number 3 was approved and released for construction on June 26, 1978. The inspector reviewed CP-12-FR revision 3 and observed specific changes in detail provided adequate clarity. Also additional inspection criteria and forms for quality control documentation are provided.

4. Corrective Action Taken in Concrete Placement of Containment Basemat Block LSK 104-B

The inspector observed concrete placement of containment basemat block LSK 104-B shortly after start of the placement at midday September 12, 1978. He observed that method used in depositing concrete from conveyor vertically through about 25' of telescoping plastic drop chutes caused separation of the aggregate from the mortar and scattering of the three-quarter inch, maximum size aggregate. The placement and practice could have caused segregation of the aggregate in the mix. The inspector discussed this with S&W and M-K QC personnel with the result that the concrete placement was delayed. Changes were made to the drop chute to provide a section of chute with reduced diameter to control the concrete velocity at exit, and to extend the chute to deposit concrete as close as possible between rebar to its final position in the forms. Continuation of concrete placement complying with requirements was observed by the inspector to complete block LSK 104-B. No undue scattering of aggregate or segregation was observed in remainder of pour.

5. Noncompliance in Concrete Cure of Containment Basemat Blocks LSK 104-B and 103-A

Concrete placements LSK 104-B and 103-A for the containment tendon gallery basemat were completed mid afternoon and evening, respectively, September 12, 1978. M-K construction procedure CP-11-FR, requires in Section VI.N, Preservation of Moisture:

1. For concrete surfaces not in contact with forms, one of the following procedures as applicable shall be applied immediately after completion of placement and finishing:
 - a. Ponding or continuous sprinkling
 - b. Application of absorptive mats or fabric kept continuously wet
 - c. Application of sand kept continuously wet
 - d. Continuous application of steam or mist spray
 - e. Application of an approved waterproof sheet material
 - f. Application of other moisture-retaining covering as approved or in specification
 - g. Application of an approved membrane curing compound

The inspector observed on the afternoon of September 12, following completion of concrete placement on pour 104-B that horizontal construction joint areas were not provided with any above methods for moisture preservation or moisture addition. On the morning of September 13 and throughout that day, moist cure was not applied to pour 104-B or 103-A until late in the afternoon. However, on the morning of September 14 about 30 percent of both areas were surface dry. Vertical wall wooden forms were stripped from 104-B on the morning of September 14 but plastic sheet covering was not sealed to prevent loss of moisture, and surfaces were dry in the afternoon before water was applied. Additionally, M-K construction procedure CP-11-FR requires in Section XI.C:

"The QC inspector will verify that the concrete curing method is properly applied and maintained for the cure period."

The NRC inspector observed that M-K QC did not verify cure method on pours LSK 104-B and 103-A on September 13 and 14.

Failure to provide concrete surfaces not in contact with forms with a method for preservation of moisture immediately after completion of placement and finishing, failure to continuously maintain moisture on concrete, and failure by QC to verify that cure method is properly applied is considered to be in noncompliance with Criterion V of 10 CFR 50, Appendix B. (78-12-01)

6. Observation of Concrete Placement of Containment Basemat Block LSK 104-B - Preplacement Activities for Block LSK 103-A and Rebar Installation and Cadwelding for Reactor Well Basemat

The inspector observed placement preparation and concrete placement of containment basemat blocks LSK 103-A and 104-B respectively, on September 12, 1978, and QC inspection performed in connection with this work. These activities were inspected for conformance to the following:

- Forked River Nuclear Station, Unit 1, PSAR Section V and Appendix 5D.
- B&R Specification 2700-206, Rev. 6, "Substructure"
- B&R Specification 2700-202, Rev. 8, "Production and Delivery of Concrete"
- GPU Specification 202-003, Rev. 3, "Specification for Performance of Owners Site Civil Testing"
- GPU QC Procedure FR-1-10-04, Rev. 0, "Site QA/QC Surveillance Procedure"
- M-K Construction Procedure CP-11-FR, Rev. 1, "Placement and Curing of Concrete"

The inspector determined the following activities were accomplished according to applicable specifications, codes, standards and procedures:

- a. Placement Preparation for Block LSK 103-A - forms properly secured, tight and clean; rebar and other embedments properly placed, secured, clean and specified distance from forms; preplacement inspection completed prior to concrete placement; construction joints and water stops prepared as specified and/or approved.
- b. Delivery and Placement - proper mix specified and delivered; controlled mixing and delivery time; testing at truck discharge properly performed using calibrated equipment; properly controlled concrete remixing in truck when approved water added at truck discharge; adequate crew, equipment and techniques prevented segregation; adequate consolidation with tested vibrators; inspection during placement.
- c. Aggregate and Cement Storage - aggregate of different sizes in separated storage bins; cement adequately protected; inspection of all concrete ingredients conforms to requirements for scope and frequency.
- d. Rebar Installation and Cadwelding - number 18S rebar installation for the reactor well basemat block conforms to specification 206, engineering drawings S745, S746 and S747 and pertinent rebar detail layout drawings; horizontal rebar splicing of #18 splices were observed in preparation, fabrication and checked after firing to conform to requirements. Tensile Testing of vertical #18 splices were observed in the site testing laboratory for qualification of operations.
- e. Batch Plant Operation - accuracy of material control and temperature control; inspection, generation and control of batch plant print-out records and truck tickets; inspection of materials and batching by qualified QC inspection personnel.

No items of noncompliance, other than that identified in Paragraph 5, were identified.

7. Observation of Installation-Compaction and Testing of Structural Fill Around Engineered Safety Features Compartments

The inspector observed installation and testing of Class I fill at the west and south sides of the ESFC from about elevation -11' to -8', and removal/replacement of reject fill at the 48" diameter sumps south of ESFC. These activities were inspected for conformance to the following:

- Forked River Nuclear Station, Unit 1, PSAR Appendix 5D
- B&R Specification 2700-206, Rev. 6, "Substructure"
- M-K Construction Procedure CP-01-FR, Rev. 3, "Placement and Compaction of Class I Backfill"
- GPU Procedure FR-1-10-04, Rev. 0, "Site QA/QC Surveillance Procedure"

Performance of the following activities was observed:

- a. Backfill release form was signed by construction manager.
- b. Placement of approved fill in 8" (loose) layers rolled four passes with approved 25 ton vibro-roller over each lift after application of water to each layer (previous tests established no maximum limit on moisture).
- c. In-situ density tests, using a calibrated instrument (Washington 1/10 cubic foot densometer), conducted by a qualified US Testing Company technician under surveillance of S&W QC engineer, tests #127 - 130, fulfilling requirements of ASTM D 2167-72.
- d. Frequency of in-place density testing exceeded minimum requirements of one in-situ test for every full shift of compaction operation, or one test for each foot thickness of compacted backfill over an area of 18,000 square feet.
- e. Laboratory determination of natural dry density, maximum and minimum densities on soil obtained for each sample identified above, and computation of relative density of cohesion less soils, as required using ASTM D 2049-74.
- f. Relative density results fulfilled requirements that average of all tests have minimum value of 90% and none fall below 75%.

No items of noncompliance were identified.

8. Review of Ground Water and Slope Stability Records for Maintenance of Dewatering and Safety of Excavation Slopes

The Moretrench American Corporation (MTA) has contract for installation and maintenance of the dewatering system surrounding and within the excavation for the Forked River Unit 1 facility. This is not a safety related activity and, therefore is not required to conform to 10 CFR 50, Appendix B. However, maintenance of the required level of ground water within the slurry trench cut-off wall to permit construction in the dry is controlled by MTA in accordance with dewatering requirements established by B&R. MTA personnel provide assurance in control of dewatering by daily water level, pressure and flow readings as well as installation and maintenance of additional equipment as needed to assure safety of the excavation. Additional procedural requirements of the AE are imposed on the construction manager (S&W) for monitoring dewatering of the upper unconfined aquifer and the lower confined aquifer to ensure that construction proceeds within safe limits relative to consideration of ground water pressure and stability of excavation slopes. Construction manager personnel, independent of MTA, daily obtain readings on piezometers, observation wells, inclinometers and embankment slope stakes. These are submitted daily to B&R site geotechnical engineer for compilation, analyses and weekly summarization. The inspector reviewed these records for period August 4 to September 15, 1978. The records indicate conformance to criteria identified in B&R Procedure WO 3700 for Monitoring Instrumentation to Control Dewatering and Excavation.

No items of noncompliance were identified.

9. Exit Interview

At the conclusion of the inspection on September 15, 1978, a meeting was held at the Forked River site with representatives of the licensee and contractor organization. The inspector summarized the results of the inspection as described in the report.