

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

REGION I

Report No. 50-423/79-10

Docket No. 50-423

License No. CPPR-113 Priority -- Category --

Licensee: Northeast Nuclear Energy Company

P.O. Box 270

Hartford, Connecticut 06101

Facility Name: Millstone Nuclear Power Station, Unit No. 3

Inspection At: Millstone Unit 3, Waterford, Connecticut

Inspection Conducted: October 30-November 2, 1979

Inspectors: A. W. Varela
A. W. Varela, Reactor Inspector

12/3/79
date

date

date

Approved by: S. D. Ebnetter
S. D. Ebnetter, Chief, Engineering Support
Section #2, RC&ES Branch

12/12/79
date

Inspection Summary:

Inspection of October 30-November 2, 1979 (Report No. 50-423/79-10)
Areas Inspected: Routine, unannounced inspection by one regional based inspector of construction activities. The inspection involved concrete work activities for the containment and engineering safety features buildings, excavation for circulating and service water pumphouse, blast monitoring observation and record review, and inspection of work activities for protection of the containment exterior wall below grade. A plant tour inspection was performed. The inspector also reviewed the licensee's civil audits and surveillance reports. The inspection involved 26 inspector-hours by one regional based inspector.

Results: No items of noncompliance were identified.

DETAILS

1. Persons Contacted

Northeast Utilities Service Company

- * T. W. Deshefy, Resident Civil Engineer
- K. W. Gray, Supervisor - Construction Quality Assurance
- R. A. Hastings, Construction Quality Assurance
- * J. O'Brien, Construction Quality Assurance Specialist
- * S. Orefice, Superintendent - New Site Construction

Stone and Webster Engineering Corporation

- W. B. Anderson, Assistant Superintendent, Field Quality Control
- * L. J. Barbieri, Senior Field Quality Control Engineer
- * J. G. Kappas, Superintendent of Construction
- * R. H. Lane, Superintendent of Construction Services
- W. Mackay, Resident Manager
- F. K. Sullivan, Resident Engineer
- * G. G. Turner, Superintendent of Field Quality Control
- * J. L. Whedbee, Assistant Superintendent of Field Quality Control
- J. Shirley, Concrete Specialist
- R. Hike, Geotechnical Engineer
- D. Schlatka, Area Engineer/Intake Structure

* denotes those present at the exit interview. In addition, the inspector interviewed other licensee and contractor personnel during the course of the inspection, including construction crafts.

2. Site Tour

The inspector conducted a walk-through inspection of the construction site to observe work in progress. Work items were examined for any obvious defects or noncompliance with regulatory requirements or licensee commitments. Particular note was taken of the presence of quality control inspectors and evidence of quality control activities such as inspection records, material identification, nonconforming material, identification and equipment calibration tags. The inspector interviewed craft personnel and quality inspection personnel as available. Specific activities observed for the containment building's exterior wall were rebar-cadwelding, concreting, membrane, rattle-space cushion and ring girder installation. The containment's interior crane wall was also observed in pre and post concreting status. Rock excavation and rock mapping was observed underway for the circulating and service water pumphouse and intake structure.

Additionally, concrete preparations for the ESF building walls, preparations for installing rock anchors for service building foundation, preparations for demineralized water tank foundations, rebar installations for the auxiliary building upper slab and control building upper floor, and off-stand assembly of the containment dome liner were observed in progress.

No items of noncompliance were identified.

3. Observation of Work Performance and Quality Controls in Concrete Placement

The inspector observed work being performed and quality verification of work accomplished in structural concrete placement on two separate days during his presence on the site. Containment exterior wall pours #C-3388 and #C-3389, engineering safety features wall pour #C-3383 and the structural ring girder around the containment to maintain isolation from the surrounding rock, pour #C-3377 were observed to verify that activities were accomplished according to criteria identified in the following:

- Millstone Nuclear Power Station, Unit 3 PSAR Chapter 3 and its referenced codes, standards and PSAR Chapter 17
- Job Specification #C-999, Placing Concrete and Reinforcing Steel, Revision 1, Addendum #C, August 7, 1978 and E&DCR's #FS-2123, April 16, 1979 and #FS-2216, June 13, 1979
- Job Specification #C-281, Mixing and Delivering Concrete
- S&W QAD's 10.2, 11.2; QS's 10.12, 11.11.

The inspector observed construction supervision and engineering personnel directing work activities, and quality control personnel inspecting, testing, and providing quality verification of these activities:

- Preplacement Preparation and Inspection Report: checkout card signed off by craft supervisors and responsible field engineer indicating forms properly secured, tight and clean; rebar properly placed, secured, free of nonbonded concrete, excessive rust scale and proper form distance; construction joint adequately prepared and cleaned; release of pour by area engineer and approval by Quality Control completed prior to placement.

- Delivery and Placement: proper mix specified, central mixed and truck delivered; properly controlled concrete remixing in truck when approved water was added at truck discharge; pumped thru steel pipe; controlled prior to pumping for slump, air and temperature; correlation testing at end of pump line and truck discharge, and casting of cylinders for compressive strength by qualified personnel using calibrated equipment at prescribed frequency; controlled drop of concrete thru rebar; concrete liquefaction, horizontal movement and densification of concrete adequately controlled; adequate crew and equipment applied with coordination directed by field engineering supervision.
- Batch Plant Operation: accuracy of material and temperature control; generation and control of batch records-truck tickets; QC inspection for frequency and scope, using qualified inspectors and Quality Control personnel.
- Aggregate and Cement Storage: cement bulk storage provided adequate protection relative to moisture and storage time does not exceed requirements; aggregate stored in bins without segregation; inspection of concrete materials prior to usage; aggregate in-process sampled and tested.
- Construction Joint Preparation and Curing: containment exterior wall was rugasol treated, air-water jetted after initial set to remove surface mortar and expose aggregate; moist curing prescribed for seven days.

No items of noncompliance were identified.

4. Observation Installations for Protection of Containment Exterior Wall Below Grade

The PSAR commitment of concrete backfill in the annular space between excavated rock and the containment exterior wall was revised as identified in licensee correspondence to the USNRC, June 13 and October 13, 1977. The inspector reviewed S&W engineering drawings of the EC-49 series for information regarding construction requirements in design of the ring girder and radial walls in the ESF building, and for protection against potential rock-joint movement when acted on by seismic loadings.

The following details were observed installed and being installed during this inspection:

- a. Plexiglass sheets with ventilated backing against containment wall.
- b. 4" (in two layers) of compressible plastic for rattle space over the plexiglass sheets.
- c. Covering of butane rubber membrane waterproofing sandwiched between plastic layers.
- d. Structural ring girder, beam reinforced with #11 reinforcing steel and poured between compressible material and excavated rock from top of mat to top of rock.

No items of noncompliance were identified.

5. Observation of Excavated Rock for the Circulating and Service Water Pumphouse Intake Structure

The inspector observed the dewatered area enclosed within the temporary stone and sheet pile dike on the shore of Niantic Bay. Rock excavation was completed for mat of the intake structure to elevation -32 from highest inshore top of rock of about -7. Excavation cleanup at bottom had not advanced sufficiently for rock-mapping. The inspector discussed with S&W geotechnical representative the bedrock geology. Although mapping was incomplete, it appears that the bedrock is similar to that of the general area in that irregular outcrops of Westerly granite intrude the Monson gneiss. In telephone conversation with licensee, November 8, 1979, the inspector was informed that small displacement faults running north-south were found in the excavated rock. Licensee stated this finding was reported to the NRC, Office of Nuclear Reactor Regulation.

No items of noncompliance were identified.

6. Review of Rock Blast Records and Observation of Blast Monitoring

The requirements for control of rock blasts are established in S&W Specification C-949 for excavation for Discharge Tunnel which identifies the charge weight in a single blast or delay shall be limited to that which produces specified limiting levels of ground vibration. The charge weight per delay shall be such that the peak radial particle velocity measured by a three-component seismograph (Sprengnether VS-1100 or VS-1200):

- a. falls below the designated site curves of Particle Velocity versus Frequency;

- b. p.p.v. shall not exceed 2" per second at a distance of 120' ;
- c. where a structure is closer than 120', the p.p.v. at the structure shall be limited to 5" per second;
- d. when blasting is being conducted at any time, 0 to 24 hours after pouring of concrete on the site, the p.p.v. on the foundation material at the location of the fresh concrete shall be limited to the following:

<u>Time</u>	<u>Peak Particle Velocity</u>
0-11 hours	0.11 in/sec
12-24 hours	2.00 in/sec

Rock excavation is subcontracted to Blakeslee Company. Records of intake structure, rock excavation, of blasting and monitoring of the blasts were reviewed. S&W quality standard QS-9.21 on Rock Blasting establishes these requirements for S&W field engineers, construction supervision and quality control/geotechnical personnel:

- a. review and approval of contractors Blast Data Sheet (B.D.S.);
- b. maintain and operate recording seismographs;
- c. prior to loading of holes and blasting BDS is approved by S&W construction engineer;
- d. FQC verifies hole size, depth and loading, signs BDS to release for loading of holes and witness loading;
- e. FQC assures positioning of blast mats, seismographs, distance/cure status of fresh concrete and completeness of the BDS for submission to geotechnical engineer for release to blast; and
- f. FQC verifies results of measured blast velocities and checks for compliance to project specifications.

The inspector reviewed QC blast records for the past two months period for conformance to criteria and requirements identified above. Complete documentary evidence on blasts number 0500 through 0532, September 26 through October 16, 1979 were observed in compliance with the projected specifications.

The inspector observed a rock blast made October 31, 1979 at 7:30 a.m., for the foundation of the demineralized water tank on the east side of the containment building and 65' east of the ESF outer wall. He witnessed the drilling, loading, seismograph installation, processing of the blast data sheet and verified the peak particle velocity measurements made by two VS-1100 Sprengnether seismographs. One seismograph was located on the ESF wall and another 14' north of the blast to measure blast vibrations. The resulting recorded maximum velocity measurements were 0.19 in/sec. at the first instrument and 1.45 in/sec. for the latter. These were in compliance with the project specifications.

No items of noncompliance were identified.

7. Review of Licensee Civil Audits and Surveillance Reports

Licensee audits of civil work and quality verification activities performed by S&W were reviewed by the inspector. Audit numbers A40488, 40490 and 40500 covered civil work activities in cadwelding, concrete testing and reinforcing steel qualifications, and concrete and reinforcing steel installation for these dates, September 1978, June 1979 and August 1979 respectively. These audits were found by the NRC inspector to be performed at frequency required, to follow prescribed check lists with adequate detail, and the procedural requirements including followup and closeout appeared completed. Additionally, the licensee performed civil surveillance inspections on day-to-day construction activities and produced twenty-eight reports during period February 23 and October 1, 1979. The subject of these reports are cadwelder qualifications and cadwelding, reinforcing steel placement, concrete batch plant, concrete placement, concrete testing and backfill placing and testing. These were reviewed by the NRC inspector who observed them to be in conformance with licensee commitments and required followup and close out was properly executed.

No items of noncompliance were identified.

8. Statistical Evaluation of Concrete Cylinder Compressive Strength - Unresolved Item

The PSAR states that the compressive strength of concrete cylinders will be evaluated on a statistical basis by the engineers in accordance with ACI 214-65 and Chapter 17 of ACI 301. The inspector was informed the S&W computer runs for statistical concrete evaluation are in Boston and will be available at the site for review by the inspector at the next NRC inspection. This is an unresolved item, number 423/79-10-01.

9. 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 disclosed during the inspection is discussed in paragraph 8.

10. Exit Interview

The inspector met with licensee and constructor representatives at the conclusion of the inspection on November 2, 1979. The inspector summarized the purpose and the scope of the inspection and the findings.