

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report No. 50-336/86-27

Docket No. 50-336

License No. DPR-65 Category C

Licensee: Northeast Nuclear Energy Company
P. O. Box 270
Hartford, Connecticut 06141-0270

Facility Name: Millstone Nuclear Power Station, Unit 2

Inspection At: Berlin and Waterford, Connecticut

Inspection Conducted: December 9-12, 1986

Inspectors: A. A. Varela
A. A. Varela, Lead Reactor Engineer

JAN. 9, 1987
date

NRC Contact Personnel: M. E. Nitzel, EG&G, Idaho
V. B. Call, EG&G Idaho

Approved by: J. R. Strosnider
J. R. Strosnider, Chief, Materials and
Processes Section, EB, DRS

1/12/87
date

Inspection Summary: Inspection on December 9-12, 1986 (Inspection Report Number 50-336/86-27).

Areas Inspected: A special announced inspection by a regional-based inspector and two contractor personnel was conducted at the licensee's engineering office and the Millstone 2 plant site. The inspection encompassed review of licensee responses and subsequent analysis and modifications of masonry walls related to IE Bulletin 80-11, Masonry Wall Design. The inspection included a walkdown of existing walls affecting safety related equipment, a review of design analyses and a review of work packages on wall modifications.

Results: No violations were identified.

8702110344 870202
PDR ADDCK 05000336
Q PDR

DETAILS

1.0 Persons Contacted

Northeast Utilities (NU)

J. Bergin, Plant Engineer
*J. Briggs, Supervisor, Generation Engineering
W. Frisbie, Quality Assurance Engineer
*G. L. Johnson, Director, Generation Engineering Design
*D. Robinson, Senior Engineer
*R. N. Smart, Manager, Civil Engineering
*R. P. Werner, Vice President, Generation Engineering Construction

Bechtel Power Division (BPD) Gaithersburg, MA

P. Carrato, Senior Engineer

NRC Contractor EG&G Idaho Inc.

*V. B. Call, Senior Engineer
*M. E. Nitzel, Engineer Specialist

*Attendees at exit meeting on December 12, 1986

2.0 Inspection Purpose And Scope

The purpose of this inspection was to review with cognizant and responsible licensee representatives at the corporate office and the plant the completeness of their responses to NRC/IE Bulletin 80-11, Masonry Wall Design. The scope of the inspection included a review of engineering design and quality assurance documentation relating to inspection, testing, analysis and modifications satisfying requirements and licensee commitments with respect to the bulletin. A walkdown inspection of the plant was conducted to verify the acceptability of repairs and/or modifications relating to the bulletin.

3.0 Review Criteria

The latest revision of the bulletin was used to define required actions by the utility. In addition, Temporary Instruction (TI) 2515/37 was used to further define inspection requirements. Applicable sections of the Code of Federal Regulations (10 CFR 50) were used.

4.0 Review Of Licensee Responses

The inspection team reviewed bulletin responses available from NRC files prior to the inspection. These responses included reports addressing the reevaluation methodology, acceptance criteria, wall configurations and

functions, structural adequacy, proposed modification plans, and modification schedules. Table 1 lists those documents reviewed prior to the inspection. Any items of noncompliance or those requiring further discussion were noted as items to be addressed while at the corporate office or plant site. Questions relating to licensee responses were forwarded to licensee in advance of the inspection as a preliminary agenda for discussion.

The inspection team reviewed additional material provided by the licensee during the inspection. This material consisted of procedures governing the original wall survey and reevaluation activities, reevaluation calculations, structural adequacy of wall modifications, construction packages for wall modifications, and QA/QC documentation. The documents reviewed are listed in Tables 2 and 3.

4.1 Findings

It was determined from the review of the documentation described above that, in general, all aspects of the work done in response to the subject bulletin were acceptable. However, two unresolved items were identified. Further details regarding these items are given below.

IEB 80-11 required the inspection and reevaluation of safety related masonry walls to assure structural adequacy. In order to assure continued compliance with bulletin requirements, physical conditions such as absence of mortar cracking and assumed boundary conditions must be maintained. The licensee was asked to provide a surveillance plan for routine inspection of masonry walls subject to bulletin action to demonstrate continued compliance. No formal plan for routine surveillance currently exists. However, the licensee did produce a draft for a procedure that would govern periodic surveillance of the subject walls at the licensee's Haddam Neck plant. The licensee representatives noted that it was their intention to use this procedure to govern continuing masonry wall surveillance activities at all their nuclear power plants. The licensee stated that work was still in progress in formalizing the procedure. This item is unresolved pending completion of the procedure and review by the NRC. This is unresolved item number (50-336/86-27-01).

The procedural control over mortar joint repair work was reviewed by the inspector. The only procedural controls over mortar joint repairs, were those accomplished in conjunction with another wall modification.

The licensee stated that a mortar joint repair procedure that would govern any repair activities required by the continued periodic surveillance program was being developed. It was stated that this procedure would incorporate research into the latest materials available for use in this type of repair. This item is unresolved pending completion of the procedures and review by the NRC. This is unresolved item number (50-336/86-27-02).

The licensee representatives acknowledged the unresolved items and agreed to respond by submitting to the NRC a draft of the surveillance plan procedure by December 31, 1986. The licensee representatives also agreed to submit a draft copy of the mortar joint repair procedure for NRC review. This procedure would be submitted prior to the end of February, 1987. Formalization of both procedures would then be completed prior to the beginning of the next refueling outage (approximately June, 1987).

5.0 Verification Walkdown Inspection

A physical inspection of certain masonry walls subject to bulletin action was conducted. The walls included in this sample were chosen by the inspection team. The purpose of this walkdown was to verify samples of inspections and/or modifications required by the bulletin. The walls listed in Table 4 were examined.

5.1 Findings

During the walkdown inspection, it was noted that eight masonry walls out of the 29 sampled had incurred cracks not shown on the wall survey sheet or differing from that shown on the survey sheets:

1. Walls 3.6, 3.18, 3.29, 4.18, and 9.35 were found to contain cracks at one or both side boundaries extending the full height of the wall.
2. Wall 7.5 was found to contain mortar and through block cracking on the west face of the wall near cabinet MUX-5.
3. Wall 1.21 was found to contain mortar cracking on the north face of the wall in addition to that originally noted on the south face during the original survey. This appeared to be a through wall crack.
4. The original survey of wall 7.8 noted a hairline crack at the east boundary. During this walkdown inspection, it was noted that the crack extended the full length of the wall and included a large separation (approximately one inch or larger). Although this wall does not affect safety related equipment, the changing nature of the crack and the magnitude of displacement further indicate the desirability for continued surveillance of those walls that are in the safety-related category.

Further review of the reevaluation calculations and additional evaluations indicated that none of the cracks noted above would pose an immediate hazard to the structural adequacy of the subject walls. The probable causes of the cracks noted above could not be determined at the time of the inspection. As noted under the findings described in paragraph 4, the licensee is currently developing a continuing surveillance and repair plan. The observations made during the walk-down inspection emphasize the need for the licensee to ensure that the procedures currently being developed include appropriate measures to:

1. Provide an analysis of the probable cause of any newly discovered cracks.
2. Perform an evaluation of the structural adequacy of the subject walls taking into account the effects of the cracks or any other degraded physical condition.
3. Provide for the timely repair of any masonry wall for which the structural adequacy cannot be assured.

6.0 Licensee Administrative Controls And Assurance Of Quality

To determine the adequacy of administrative controls for assuring quality work, the inspector examined records of inspection/verification and materials control. The inspector also verified the availability and retrievability of pertinent documents, and reviewed procedures that established those requirements. The pertinent documents examined are identified in Table 5.

Based on the above examination and review, the inspector determined that the administrative controls were adequate and effective to assure quality. Sufficient inspections and verifications were performed to assure conformance of the masonry wall surveys and modifications to established requirements, specifications, and drawings.

Findings

No violations were identified. Based on the results of this inspection IEB 80-11 is closed.

7.0 Definition Of Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable, violations, or deviations relative to the bulletin requirements. Unresolved items identified during this inspection are discussed in paragraphs 4.0 and 5.0 above.

8.0 Exit Meeting

The exit meeting was conducted by the NRC inspector. The NRC contractor personnel and licensee representatives (denoted in paragraph 1) were in attendance. The NRC inspector summarized the inspection findings and the licensee acknowledge these comments. No written material, other than that described in paragraph 4.0 (preliminary agenda for discussion) was provided to licensee personnel.

TABLE 1

DOCUMENTATION REVIEWED PRIOR TO INSPECTION

<u>Document</u>	<u>Description</u>
- - - -	W. G. Council (NUSCO) letter to B. H. Grier (USNRC) dated 07/07/80 forwarding licensee's 60 day response to IEB 80-11.
- - - -	W. G. Council letter to B. H. Grier dated 11/04/80 transmitting licensee's 180 day response to IEB 80-11.
- - - -	W. G. Council letter to B. H. Grier dated 03/03/81 providing status of IEB 80-11 activities and requesting schedule extension.
3210150699	R. A. Clark (NRC) letter to W. G. Council dated 09/28/82 requesting additional information regarding responses to IEB 80-11.
810624	W. G. Council letter to R. A. Clark dated 12/03/82 forwarding additional information regarding IEB 80-11 activities.
8402160650	G. Lear (NRC) memo to J. Miller (NRC) dated 02/13/84 forwarding results of a review of licensee submittals and requesting additional information.
- - - -	J. Miller letter to W. G. Council dated 02/24/84 requesting additional information regarding IEB 80-11 activities.
- - - -	W. G. Council letter to J. R. Miller dated 05/11/84 forwarding partial response to the 02/24/84 request for additional information regarding IEB 80-11.
- - - -	W. G. Council letter to J. R. Miller dated 11/02/84 forwarding additional responses to the 02/24/84 request for additional information regarding IEB 80-11.
- - - -	W. G. Council letter to J. R. Miller dated 01/04/85 forwarding additional responses to the 02/24/84 request for additional information regarding IEB 80-11.
8504090186	R. Besnak (NRC) memo G. Lainas (NRC) dated 03/28/85 forwarding results of the review of licensee submittals and a Safety Evaluation Report (SER).
- - - -	J. Miller letter to W. G. Council dated 04/17/85 transmitting the SER regarding IEB 80-11 actions taken at Millstone 2. Followup information requested.

<u>Document</u>	<u>Description</u>
- - - -	J. F. Opeka letter to J. R. Miller dated 05/22/85 providing commitment and schedule for the reevaluation of masonry walls qualified by inelastic methods.
- - - -	J. F. Opeka letter to E. J. Butcher dated 10/28/85 transmitting results of the reevaluation of masonry walls originally qualified by inelastic methods.
- - - -	D. B. Osborne (NRC) letter to J. F. Opeka dated 10/20/85 forwarding supplemental SER.

TABLE 2

DOCUMENTATION REVIEWED DURING THE INSPECTION

<u>Document</u>	<u>Description</u>
- - - -	Masonry wall locations plans shown on drawings 25203-59024 through 59034.
11867-020-0002	Revision 5 of Bechtel masonry wall survey procedure.
- - - -	Letter from Thames Permacrete Co. to Bechtel regarding masonry wall mortar properties.
7604-A-1	Bechtel specification for furnishing, delivery, and erection of masonry.
EDP-4.37	Bechtel engineering procedure governing preparation and documentation of design calculations.
8011-6.1	Bechtel calculation for the justification of the use of averaged response spectra.
8011-01-GPD	Bechtel civil design aid for the calculation of the inelastic behavior of masonry walls.
11867-020-0003	Bechtel specification for the reevaluation of concrete masonry walls.
8011-PD-2.29	Bechtel plant design group calculation of wall loads for masonry wall 2.29.
11867-020-0004	Bechtel evaluation procedure for determining loads on masonry walls.
8011-001	Bechtel calculation of Millstone Unit 2 auxiliary building response spectra.
- - - -	Mercury Co. block wall structural modification procedure.
- - - -	NUSCO draft of block wall surveillance and repair procedure.
- - - -	Original survey sheets, log sheets, and modification drawings for walls 1.13, 1.12, 2.29, 2.21, 2.24, 2.17, 2.71, 3.6, 3.18, 3.25, 3.29 4.16, 4.18, 4.21, 5.10, 5.11, 7.5, 7.12, 7.13, 9.3, and 10.3.
- - - -	Modification construction packages for walls 1.13, 1.12, 2.21, 2.24, 2.17, 3.18, 3.25, 7.5, 7.12, 7.13, and 9.3.

TABLE 3
CALCULATION PACKAGES REVIEWED

<u>Calc. No.</u>	<u>Wall</u>
8011-1.13	1.13 (no mod.)
8011-1.12	1.12 (no mod.)
8011-2.29	2.29 (pipe support removed, no mod. to wall)
80-11-2.21	2.21
80-11-2.24	2.24
80-11-2.17	2.17
80-11-2.71	2.71
80-11-3.6	3.6
80-11-3.18	3.18
80-11-3.25	3.25
80-11-3.29	3.29
80-11-4.16	4.16
80-11-4.18	4.18
80-11-4.21	4.21
80-11-5.10	5.10
80-11-5.11	5.11
80-11-7.5	7.5
80-11-7.12	7.12
80-11-7.13	7.13
80-11-9.3	9.3
80-11-10.3	10.3

Note: Calculation packages listed above included the associated modification calculations unless otherwise noted.

TABLE 4

MASONRY WALLS FIELD VERIFIED

<u>Wall</u>	<u>Elevation (ft)</u>	<u>Location</u>
1.11	38'-6"	Warehouse
1.13	38'-6"	Warehouse
1.12	38'-6"	Warehouse
1.16	38'-6"	Warehouse
1.21	38'-6"	Auxiliary
1.32	38'-6"	Auxiliary
1.48	38'-6"	Auxiliary
1.51	38'-6"	Auxiliary
1.59	38'-6"	Auxiliary
2.29	14'-6"	Auxiliary
2.21	14'-6"	Auxiliary
2.7	14'-6"	Auxiliary
2.9	14'-6"	Auxiliary
2.24	14'-6"	Auxiliary
2.17	14'-6"	Auxiliary
2.71	14'-6"	Auxiliary
3.6	-5'-6"	Auxiliary
3.18	-5'-6"	Auxiliary
3.25	-5'-6"	Auxiliary
3.29	-5'-6"	Auxiliary
4.16	-25'-6"	Auxiliary
4.18	-25'-6"	Auxiliary
6.2	-54'-6"	Turbine
7.5	31'-6"	Turbine
7.12	31'-6"	Turbine
7.13	31'-6"	Turbine
9.3	14'-6"	Turbine
9.35	14'-6"	Turbine
10.3	45'-0"	Turbine

TABLE 5

DOCUMENTATION REVIEWED OF LICENSEE ADMINISTRATIVE CONTROLS

<u>Document</u>	<u>Description</u>
QM-2666	December 18-20, 1979 NUSCO/Nuclear Audit and Testing Company, Inc. (HATCO) audit of Bechtel, Gaithersburg Power Division (GPD) to assess BC quality system for work in compliance to NRC/IE Bulletins.
QM2-677	NUSCO acceptance March 10, 1980 of BC corrective actions to findings identified in QM2-666.
File A01274	NUSCO annual supplier evaluation reports of GPD supplemented by NRC Region IV vendor inspection report numbers 81-01, 03, 81-04, and 82-01.
QAF 80-1 QAF 80-2 QAF 80-3	GPDQA audits of BC procedure and plant surveys of as-built masonry walls/jeopardized safety related equipment in response to IEB 80-11 July 2, 1980 and August 8, 1980. Corrective actions completed/verification close out of above findings and turnover to GPD for design, dated December 12, 1980.
QL2-G-80 February 11, 1982	NUSCO construction QA audit A-40712 of Mercury Company (masonry wall modification contractor) QA Program conducted December 29, 1981 through January 8, 1982 identified a findings.
QL2-G-84 March 16, 1982	Mercury responses to above dated January 28, 1982, February 11, 1982, March 10, 1982, and NUSCO surveillance reports and verification of corrective actions undertaken by Mercury.
QL2-G-83 February 19, 1982	NUSCO QA audit A-40675, Turnover Documentation of Mercury and 2 findings.
March 10, 1982	Mercury response to above findings and corrective actions.
QL2-G-82 March 18, 1982	NUSCO verification and close out of A-40675.