UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

December 31, 1987

NRC INFORMATION NOTICE NO. 87-67: LESSONS LEARNED FROM REGIONAL INSPECTIONS OF LICENSEE ACTIONS IN RESPONSE TO IE BULLETIN 80-11

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is being provided to inform addressees of lessons learned from Nuclear Regulatory Commission (NRC) inspections of certain activities related to the reevaluation work conducted and plant modifications made in response to Bulletin 80-11, Masonry Wall Design, issued on May 8, 1980. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

IE Bulletin 80-11, Masonry Wall Design, addressed the potential for problems with the structural adequacy of concrete masonry walls in proximity to or with attachments to safety-related piping or equipment. In brief, all licensees for operating nuclear power reactor facilities were required to:

1. identify all masonry walls in each facility that are located in proximity to or have attachments to safety-related piping or equipment

2. provide a reevaluation of the design adequacy of the subject walls

3. provide written reports of the activities required by the bulletin

While performing inspections to follow up on IE Bulletin 80-11 activities at several plants, NRC inspectors and consultant personnel noted several deficiencies having the potential for affecting plant safety. Some of the types of deficiencies discovered are described below; specific examples are discussed in Attachment 1.

Unanalyzed Conditions

Unreinforced masonry walls were discovered to contain cracks that were not accounted for in the structural analyses of the walls. This situation was found at several plants and ranged from mortar joint cracks to through-wall cracks in block and mortar. These conditions required remedial action by licensees after the cracks were discovered.

Improper Assumptions

Several instances were found in different facilities where assumptions made during the reevaluation analyses for individual walls were either in error or had not been verified. Items in question included unsubstantiated mortar properties, faulty assumptions for wall boundary conditions, and assumed reinforcement that had not been verified. In each case, remedial action was required by the licensee.

Improper Classification

Classification of masonry walls as safety-related and not safety-related was also found to be a problem. At one site, it was discovered that five walls that were not safety-related had been reclassified as safety-related after the initial IE Bulletin 80-11 work had been completed. However, the reclassified walls were not reevaluated to verify that the bulletin requirements were met.

Lack of Procedural Controls

Several cases were identified at different facilities where activities were performed on safety-related components or equipment without proper controls. These activities included the performance of walkdown surveys, record keeping, and the control of modification activities.

Discussion

The deficiencies regarding unanalyzed conditions and faulty assumptions highlight the need for careful field verification of all critical parameters used in the qualification by analysis of masonry walls. Use of carefully written and approved procedures would have helped to prevent overlooking walls subject to bulletin action during the original surveys. Written procedures governing reclassification of or modification to the subject walls would have helped to prevent the failure to evaluate the reclassified or newly installed walls to the bulletin requirements.

NRC inspectors observed that mechanisms did not exist at certain facilities to ensure that the physical conditions of masonry walls remained as previously analyzed. Some licensees have developed programs with procedural controls requiring engineering notification, reevaluation, and periodic inspections to ensure that the structural integrity of these walls is maintained. These programs ensure that the physical condition of the walls, such as lack of mortar cracking and boundary conditions, remain as analyzed.

No specific action or written response is required by this information notice. If you have any questions about this matter, please contact the technical contact listed below or the Regional Administrator of the appropriate regional office.

Charles E. Rossi

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contact: A. A. Varela
(215) 337-5346

Attachments:
1. Examples of IE Bulletin 80-11 Inspection Findings with Potential Safety Impact
2. List of Recently Issued NRC Information Notices

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES 1987

Information Notice No.	Subject	Date of Issuance	Issued to
87-66	Inappropriate Application of Commercial-Grade Components	12/31/87	All holders of OLs or CPs for nuclear power reactors.
87-28, Supp. 1	Air Systems Problems at U.S. Light Water Reactors	12/28/87	All holders of OLs or CPs for nuclear power reactors.
87-65	Plant Operation Beyond Analyzed Conditions	12/23/87	All holders of OLs or CPs for nuclear power reactors.
87-64	Conviction for Falsification of Security Training Records	12/22/87	All nuclear power reactor facilities holding an OL or CP and all major fuel facility licensees.
87-35, Supp. 1	Reactor Trip Breaker Westinghouse Model DS-416, Failed to Open on Manual Initiation From the Control Room	12/16/87	All holders of OLs or CPs for nuclear power reactors.
87-63	Inadequate Net Positive Suction Head in Low Pressure Safety Systems	12/9/87	All holders of OLs or CPs for nuclear power reactors.
87-62	Mechanical Failure of Indicating-Type Fuses	12/8/87	All holders of OLs or CPs for nuclear power reactors.
87-61	Failure of Westinghouse W-2-Type Circuit Breaker Cell Switches.	12/7/87	All holders of OLs or CPs for nuclear power reactors.
87-60	Depressurization of Reactor Coolant Systems in Pressurized-Water Reactors	12/4/87	All holders of OLs or CPs for PWRs.

OL = Operating License
CP = Construction Permit

EXAMPLES OF IE BULLETIN 80-11 INSPECTION FINDINGS WITH POTENTIAL SAFETY IMPACT

Specific examples of some of the deficiencies discovered during the inspections performed to follow up on IE Bulletin 80-11 activities and licensee actions to correct the problems are discussed below.

A. During an inspection conducted at Indian Point, Unit 2, on September 16-20, 1985, the NRC inspectors observed mortar joint cracking in the west and south walls of the fan house. The licensee proposed an appropriate repair procedure to fix these cracks. This approach was accepted by the NRC as part of the licensee's proposed modifications. Inspectors observed evidence of repair activities during the onsite field walkdown conducted as part of the followup inspection. However, they also observed the presence of numerous mortar joint cracks, some of which were in joints that appeared to have been previously repaired.

   The NRC reevaluation acceptance criteria includes a provision for allowing tension in masonry walls that are not reinforced if the reanalysis considers assumptions and modeling techniques for boundary conditions, cracking of sections, and other conditions that would affect the dynamic behavior of these walls. A periodic surveillance program to monitor any special conditions, such as the growth of existing cracks, was not specifically required. The recurring nature of some of the observed cracks may justify a periodic surveillance by licensees to ascertain that the level of structural adequacy to which licensees committed is maintained.

B. During the field walkdown portion of the followup inspection conducted at Calvert Cliffs, Units 1 and 2, on January 13-17, 1986, the inspectors determined that two of the masonry walls included in the sample group had boundary conditions deviating from those assumed in the reevaluation analyses. There was relative motion between one wall (wall T) and the ceiling beam and the mortar joint between the wall and the ceiling beam appeared cracked for its entire length. At some points, this joint contained voids that allowed probing of the interior of the wall. The second wall (wall U) also showed evidence of cracking at the wall to ceiling beam mortar joint.

   The reanalysis assumed a simple support at the wall-to-ceiling beam location for wall T and assumed a fixed support at this location for wall U. However, the inspection team concluded that the actual boundary conditions deviated from those assumed in the reanalyses for walls T and U. The assumption of a positive connection between the wall and the ceiling beam had been an important factor in the reevaluation calculations for these two walls.

The licensee conducted a followup testing program and found that 5 of the 11 walls included in the test sample did not contain rebar as previously assumed.

C. In preparation for an NRC followup inspection to IE Bulletin 80-11 scheduled at Maine Yankee on March 10-14, 1986, the licensee conducted a new survey of masonry block walls. The survey identified 10 masonry walls that were classified as safety-related by the bulletin definitions but had not been included in bulletin actions. Of the 10 walls, 5 had been in existence at the time of the licensee's original survey (1980) and the remaining 5 walls had been added or reclassified after the original survey. The inspectors determined that surveys were not performed by controlled procedures and instructions and that this omission contributed to the lack of complete coverage of the original work.

D. During the followup inspection conducted at Oyster Creek on May 5-9, 1986, the licensee stated that approximately 200 masonry walls exist throughout the plant and that 45 of these walls had been addressed by bulletin responses. The licensee identified the walls that needed to be addressed in response to the bulletin presumably by reviewing existing plant drawings and conducting an in-plant walkdown. However, the licensee could not provide records to verify the adequacy of these activities. This lack of documentation made it impossible for the inspectors to verify that the licensee had correctly identified all the masonry walls specified by the bulletin.

For the analysis, the licensee assumed that type M mortar had been used in accordance with the original construction specification. However, no documentation showed that type M mortar was used during construction. The licensee had not developed a test program to demonstrate the strength values of the mortar used, nor had the licensee considered lower strength properties in the reanalysis.

The licensee is planning to resurvey the 200 masonry walls to reestablish baseline data (e.g., physical dimensions, boundary conditions, and attached equipment) that will be used for any future plant modifications that might affect safety-related masonry walls. This data also will be used to determine which masonry walls are categorized as safety-related. The licensee is developing a procedure to control future modifications to safety-related masonry walls. This procedure is intended to prevent the alteration of any masonry wall such that the structural analysis would be invalidated or, as an alternative, to provide for proper notification so an engineering evaluation can be completed. The licensee will perform periodic surveillance of masonry walls to ensure that the physical conditions assumed during the reanalysis effort remain valid.

During the NRC walkdown portion of the inspection, inspectors noted that wall 22 had incurred a through-wall crack and that wall 23 had incurred a similar crack. In addition, because of the location of equipment it could not be determined whether the crack in wall 23 extended through the wall. There were several other, less extensive cracks noted in these two walls. Licensee actions to correct this problem include:

1. an analysis of the probable cause of the cracks

2. documentation of the repair efforts for these cracks or a demonstration of the structural adequacy of the walls, including the effects of the cracked block and mortar

3. a description of the measures to be taken to prevent recurrence of similar cracking in these and other safety-related masonry walls that are not reinforced

E. Similar deficiencies to those specified above were also identified during the followup inspections to Bulletin 80-11 conducted at Yankee Rowe, Salem, Units 1 and 2, and Peach Bottom, Units 2 and 3. These NRC inspections were conducted on January 26-30, 1987, April 7-10, 1987, and June 15-19, 1987, respectively.

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Charles E. Rossi, Director
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Office of Nuclear Reactor Regulation

Technical Contact: A. A. Varela
(215) 337-5346

Attachments:
1. Examples of IE Bulletin 80-11 Inspection Findings with Potential Safety Impact
2. List of Recently Issued NRC Information Notices

Per telephone conversation with Varela on 12/23/87, he indicated concurrence by Strosneider and Varela.

Transmitted by memorandum to C. E. Rossi from J. R. Strosneider, Region I, dated August 4, 1987.

*SEE PREVIOUS CONCURRENCES

				D/DOEA:NRR CERossi 12/31/87
*OGCB:DOEA:NRR JGuillen 12/3/87	*D:DEST LShao 12/29/87	*RI AAVarela 12/23/87	*PPMB:ARM TechEd 11/24/87	*C/OGCB:DOEA:NRR CHBerlinger 12/11/87

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	** 12/21/87 LA (see above)			CERossi
				12/ /87
*OGCB:DOEA:NRR	D:DEST	*RI	*PPMB:ARM	*C/OGCB:DOEA:NRR
JGuillen	LShao	AAVarela	TechEd	CHBerlinger
12/3/87	12/29/87	12/23/87	11/24/87	12/11/87

** Only General Approach Reviewed - Specific Event Details Not Reviewed

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JGuillen	NChokshi	AAVarela	TechEd	CHBerlinger
12/ /87	12/ /87	12/ /87	11/24/87	12/11/87

T.G. By Phone

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