



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION
MASONRY WALL DESIGN, IE BULLETIN 80-11
MILLSTONE NUCLEAR POWER STATION UNIT 2
DOCKET NO. 50-336

The findings reported in this Safety Evaluation are based on the attached Technical Evaluation Report (TER), Attachment 1, prepared by Franklin Research Center (FRC) as a contractor to NRC. This TER contains the details of construction techniques used, technical information reviewed, acceptance criteria, and technical findings with respect to masonry wall construction at Millstone 2. The staff has reviewed this TER and concurs with its technical findings. The following is our summary of the major technical findings:

1. The licensee has identified a total of 155 safety related masonry walls at Millstone Unit 2. All but three of these safety related masonry walls have been qualified on the basis of the working stress criteria. The issue of three walls is further discussed in Item 3 below.
2. As discussed in Section 3-1 of the TER, there are several differences between the licensee's working stress criteria and the staff acceptance criteria delineated in Appendix A of the TER. Consequently, as further discussed in the TER, the staff and FRC made a detailed review of the calculated stresses in the walls and the calculation procedures used by the licensee. The staff and FRC have concluded that the Millstone Unit 2 masonry walls either comply with or meet the intent of the staff acceptance criteria.
3. Three of the masonry walls have been qualified by the licensee via the use of the energy balance technique to resist the out-of-plane forces. The staff's position on the use of the energy balance technique to qualify reinforced masonry walls is attached as Attachment 2. The implementation of the staff position is required to render these three walls acceptable to the staff.
4. The licensee has modified 55 of the safety related masonry walls using the following techniques:
 - a. The addition of structural steel to reduce the wall span.
 - b. The addition of structural steel at the top and free edges to reinforce boundary conditions.
 - c. Through-bolting multiple-wythe walls so that they may be analyzed compositely, without taking advantage of their collar joint strength.
 - d. The removal of pipe supports.

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- e. Through-bolting pipe support base plates to distribute the load to all wythes.
- f. The installation of structural shields to protect equipment in the vicinity of masonry walls.

The licensee's modification techniques are acceptable since the modified walls (except for walls relying on energy-balance technique for qualifications) have been shown to meet the intent of the staff acceptance criteria as discussed in Item 1 above.

Based on the above findings, the staff concludes that, with the exception of the three walls requiring implementation of the staff position on the use of the energy balance technique, Items 2(b) and 3 of IE Bulletin 80-11 have been fully implemented at Millstone 2 and that there is a reasonable assurance that the safety-related masonry walls at Millstone 2 will withstand the specified design load conditions without impairment of (a) wall integrity or (b) the performance of the required safety functions.

Principal Contributor
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Attachments:
1) FRC TER
2) Staff position