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Docket No. 50-331

Mr. Duane Arnold, President
Iowa Electric Light and Power Company
P. O. Box 351
Cedar Rapids, Iowa   52406

Dear Mr. Arnold:

We are continuing our review of your response to IE Bulletin 80-11
concerning masonry wall design and have identified the need for
additional information.

Accordingly, please provide the information identified in Enclosure 1
within 60 days of receipt of this letter.

OMB clearance is not required for this request since it is being
transmitted to nine or fewer addressees.

Please contact your NRC Project Manager should you have any questions.

Sincerely,

"ORIGINAL SIGNED BY"

Thomas A. Ippolito, Chief
Operating Reactors Branch #2
Division of Licensing

Enclosure:
Request for Additional
   Information

cc w/enclosure:
See next page
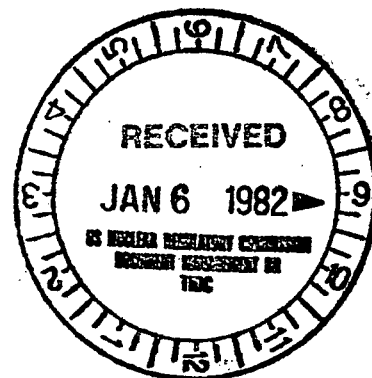
OFFICE ▶	ORB#2:DL	ORB#2:DL	C-ORB#2:DL				
SURNAME ▶	KEccleston:cf	SNorris	TIppolito				
DATE ▶	12/25/81	12/28/81	12/1/81				

Mr. Duane Arnold
Iowa Electric Light & Power Company

cc:

Mr. Robert Lowenstein, Esquire
Harold F. Reis, Esquire
Lowenstein, Newman, Reis and Axelrad
1025 Connecticut Avenue, N. W.
Washington, D. C. 20036

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Cedar Rapids, Iowa 52401

U. S. Nuclear Regulatory Commission
Resident Inspectors Office
Rural Route #1
Palo, Iowa 52324

TECHNICAL EVALUATION

Based on the Licensee's submittals [2, 3], a technical review was conducted. Before a final technical evaluation report can be issued, the Licensee is required to provide the following information:

1. With regard to the material strength, identify the type of masonry and mortar used and justify their compressive strengths as given in Attachment 3, Section 4 [3].

2. In Section 5.1.1 [3], the allowable shear or tension stresses at the concrete core/block wythe interface was stated to be 8 psi. Provide technical justification for this value.

3. With regard to shear and bond stresses for factored loads, a factor of 1.67 was introduced. SEB criteria [4] allow a factor of 1.3 for shear carried by masonry. Justify the use of a factor of 1.67.

4. With regard to tension stress, a factor of 1.67 was introduced for factored loads. Indicate if this factor is used for tension normal or parallel to the bed joint. SEB criteria [4] allow a factor of 1.3 for masonry tension perpendicular to the bed joint (for unreinforced masonry) and a factor of 1.5 for masonry tension parallel to the bed joint. In view of this, provide justification for the factor of 1.67.

5. In Section 5.2.1 [3], for factored loads, a factor of 1.5 was given for the shear and tension of the collar and core/wythe interface. Justify this factor.

6. In Section 5.2.1 [3], the Licensee discussed the stress values used for walls without inspection. Indicate if any walls at the Duane Arnold plant fall into this category.

7. With regard to the in-plane strain allowable for nonshear walls, provide the technical basis for the value used for the unconfined wall.

8. The Licensee introduced (a) the method of nonlinear analysis, (b) the energy balance technique, and (c) the arching theory. It is the NRC position that these techniques should not be used in the absence of conclusive evidence of their validity as applied to masonry structures.

9. With regard to damping, the Nuclear Regulatory Guide [4] allows 4% for reinforced concrete subject to the safe shutdown earthquake. Justify the use of 5%.

10. With respect to modes of vibration that are higher than the
    fundamental mode, indicate how the higher mode effects are accounted
    for.

11. With regard to seismic analysis, indicate how the components of
    seismic load in various directions are accounted for.

12. Indicate how pipe and equipment loads are accounted for.

13. With regard to the composite behavior of multiple wythe walls, the
    Licensee limited the shear and tension wythe interface to 22.4 psi
    for normal loading cases and 37.3 psi for extreme loading cases.
    Provide the technical basis for these values.

14. With respect to the load combinations, the Licensee's submittal [3]
    did not provide any factor greater than 1.0 for components of the
    combinations. Explain and justify this deviation from the plant's
    FSAR.

15. Discuss how the value of Young's modulus was selected for various
    calculations.

REFERENCES

1. IE Bulletin 80-11
    "Masonry Wall Design"
    NRC, May 8, 1980

2. L. D. Root (Iowa Electric Light and Power Company)
    Letter with Enclosures to J. G. Keppler (NRC)
    July 7, 1980

3. L. D. Root (Iowa Electric Light and Power Company)
    Letter with Enclosures to J. G. Keppler (NRC)
    November 10, 1980

4. Standard Review Plan, Section 3.8.4, Appendix A
    "Interim Criteria for Safety-Related Masonry Wall Evaluation"
    NRC, July 1981

5. Uniform Building Code
    International Conference of Building Officials, 1979

6. ACI 531-79 and Commentary ACI 531-R-79
    "Building Code Requirements for Concrete Masonry Structures"
    American Concrete Institute, 1979

7. ATC 3-06
    "Tentative Provisions for the Development of Seismic Regulations for
    Buildings"
    Applied Technology Council, 1978

8. "Specification for the Design and Construction of Load-Bearing
    Concrete Masonry"
    National Concrete Masonry Association (NCMA), August 1979

9. Standard Review Plan, Section 3.7.2
    "Seismic System Analysis"
    NRC, July 1981