Detroit

2000 Second Avenue Detroit Michigan 48226 (313) 237-8000 Harry Tauber Vice President Engineering and Construction

April 20, 1981 EF2 - 52,623

Mr. Robert L. Tedesco Assistant Director for Licensing Division of Licensing U. S. Nuclear Regulatory Commission Washington, D. C. 20555



Dear Mr. Tedesco:

Reference: Enrico Fermi Atomic Power Plant, Unit 2 NRC Docket No. 50-341

Subject: Category I Masonry Walls

This letter responds to an April 21, 1980 generic request for information by Mr. Steven A. Varga, formerly of the NRC Division of Project Management. Mr. Varga's letter requested information on the use of Category I masonry walls in plants under construction.

Information specific to Fermi Unit 2 is attached in response to the six questions in the NRC information request. The responses show that the design and use of concrete masonry block walls are adequate at Fermi Unit 2.

Please do not hesitate to contact me if you have additional questions on this subject.

Sincerely,

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Attachment

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cc: Mr. B. Little Mr. L. L. Kintner

Attachment 1

Detroit Edison Responses to the 6 Questions Enclosed in S. A. Varga's April 21, 1980 Letter to All CP and OL Applicants

NRC Question 1

Are there any concrete masonry walls being used in any of the Category I structures of your plant? If the answer is "No" to this question there is no need to answer the following questions.

Detroit Edison Response 1

There are concrete masonry walls in Seismic Category I structures in the Fermi 2 plant. However, these walls are not used as load-bearing walls.

NRC Question 2

Indicate the loads and load combinations to which the walls were designed to resist. If load factors other than one (1) have been employed, please indicate their magnitudes.

Detroit Edison Response 2

The walls have been designed for the following load combinations:

a. $D + 1.5 E_{0}$ b. $D + 1.5 E_{s}$

Where D = Dead load (self weight) of wall

Eo = Operating basis earthquake load

E_s = Safe shutdown earthquake load

NRC Question 3

In addition to complying with the applicable requirements of the SRP Sections 3.5, 3.7 and 3.8, is there any other code, such as the "Uniform Building Code" or the "Building Code Requirements for Concrete Masonry Structures" (proposed by the American Concrete Institute) which was or is being used to guide the design of these walls? Please identify and discuss any exceptions or deviations from the SRP requirements or the aformentioned codes.

Detroit Edison Response 3

The walls have been designed according to National Concrete Masonry Association recommendations, as described below.

The design of the walls consisted of checking the induced stresses versus the acceptable stresses. The following stress criteria have been used:

a. for D + 1.5 E_0 loading allowable stress b. for D + 1.5 E_2 loading (0.9 X 2 X allowable stress)

Following is a list of references that were used:

- (1) Uniform Building Code 1976
- (2) ASTM C90-75 and C90-66
- (3) Research Data and Discussion Relating to Specification for the Design and Construction of Load-Bearing Concrete Masonry-National Concrete Masonry Association (NCMA) - 1970

Detroit Edison Response 3 (continued)

- (4) Design Manual The Application of Non-Reinforced Concrete Masonry Load-Bearing Walls in Multi-Storied Structures - NCMA
- (5) Specification for the Design and Construction of Load-Bearing Concrete Masonry - NCMA
- (6) Masonry Design Manual James E. Amrhein, 2nd Edition
- (7) Sizes and Shapes of Concrete Masonry Units NCMA TEK #2A
- (8) Engineered Concrete Masonry Wind Loads NCMA TEK #24
- (9) Flexural Design of Non-Reinforced Engineered Concrete Masonry-NCMA TEK #27
- (10) Combined loads on Concrete Masonry Walls NCMA TEK #34

NRC Question 4

Indicate the fined that you used to calculate the dynamic forces in masonry walls due to earthquake, i.e., whether it is a code's method such as Uniform Building Code, or a dynamic analysis. Identify the code and its effective date if the code's method has been used. Indicate the input motion if a dynamic analysis has been performed.

Detroit Edison Response 4

To account for the effect of dynamic forces exerted in the event of an earthquake, the walls are designed for equivalent static forces.

Dynamic lateral force = (mass X acceleration X 1.5)

The earthquake acceleration is read from the plant horizontal response spectra at the applicable floor and for the computed natural frequency of vibration for the wall.

The natural frequency of vibration of the walls is computed on the basis of one-way or two-way action as applicable for the boundary conditions and the dimensions of the wall.

The effect of the vertical dynamic forces has similarly been accounted for.

Detroit Edison Response 4 (continued)

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The following is a list of references that were used in these analyses::

- Sargent and Lundy Report SL-2682 revised September 27, 1974
- (2) Structural Dynamics Biggs
- (3) Formulas for Stress and Strain Roark and Young, 5th Edition
- (4) Formulas for Nitural Frequency and Mode ShapesBlevins 1979

NRC Question 5

How were the masonry walls and the piping/equipment supports attached to them designed? Provide enough numerical examples including details of reinforcement and attachments to illustrate the methods and procedures used to analyze and design the walls and the anchors needed for supporting piping/equipment (as applicable).

Detroit Edison Response 5

Piping or equipment is not supported on masonry walls. The walls are basically non-load-bearing partitions or shield walls. However, minor attachments of weight insignificant in comparison to the weight of the wall, e.g., junction boxes, are permitted. Insignificant weight is considered to be less than 2% of the weight of the wall. In cases where the weight of items attached to the wall is larger, the actual weight of the attachment was considered in design.

NRC Question 6

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Provide plan and elevation views of the plant structures showing the location of all masonry walls for your facility.

Detroit Edison Response 6

The location of the masonry walls can be found on the following Fermi 2 drawings:

> 7A721-2001 through 2004 6A721-2007 6A721-2008 6A721-2047 6A721-2182 through 2187 6C721-2608 6C721-2609

Three copies of these drawings were filed with Edison's response to this request for information.