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4 November 1969

Dr. Peter A. Morris, Director  
Division of Reactor Licensing  
U. S. Atomic Energy Commission  
Washington, D.C. 20545

Re: Dresden Nuclear Power Station Units 2 and 3  
Docket Nos. 50-237 and 50-249

Dear Dr. Morris:

We transmit herewith a draft of a supplement to our final report concerning the Operating License Review for Dresden Nuclear Power Station Units 2 and 3, transmitted to you in draft form under date of 30 July 1969. We await your instructions concerning the way in which you wish the final report to be issued, either as a final copy of the July report with the final copy of the supplement attached, or as a single revised report. The latter procedure will be less satisfactory since it will be difficult to include an adequate explanation of the basis for the revisions.

Sincerely yours,

*N M Newmark*

N. M. Newmark

bjp  
Enclosure

*Rec'd in files 1-12-72*

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DRAFT

SUPPLEMENTAL REPORT TO AEC REGULATORY STAFF  
ADEQUACY OF THE STRUCTURAL DESIGN FOR  
DRESDEN NUCLEAR POWER STATION UNITS 2 AND 3

Commonwealth Edison Company

AEC Docket Nos. 50-237 and 50-249

by

N. M. Newmark

W. J. Hall

4 November 1969

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ADEQUACY OF THE STRUCTURAL DESIGN FOR DRESDEN NUCLEAR  
POWER STATION UNITS 2 AND 3

Commonwealth Edison Company

by

N. M. Newmark and W. J. Hall

This supplementary report on the Dresden Nuclear Power Station Units 2 and 3 is based on Amendments 15/16 through 20/21, prepared by the Commonwealth Edison Company. It takes into account data presented at meetings on 18 August 1969 with the applicant in Chicago, and on 3 September 1969 with the applicant at Urbana.

Reference is made to the letter from this organization to Dr. Peter A. Morris, dated 3 September 1969, covering three points on which our preliminary approval of the seismic design was based. These points are as follows:

"(1) The proper seismic analyses and combinations of stress will be or have been made for all Class I items for both the Design Basis Earthquake (0.2g) and the Operating Basis Earthquake (0.1g). Either Time History analyses, Modal Response analyses, or Static Coefficient analyses are made for the items, as listed in Amendment No. 19/20, Section D-2, 3, pp. 39-40.

"(2) The changes necessary to meet the previously stated design criteria for both DBE and OBE will be made if required by the results of the analyses.

"(3) In general, thermal and other applicable forces will be combined with seismic forces in the determination of stresses and deformations."

Amendment No. 20/21 covers essentially these points and has been reviewed by Drs. Hall and Newmark in some detail. As a result of this review,

we believe that the conditions quoted above, as stated in our letter of 3 September 1969, have been met, and that the applicant has demonstrated a reasonable basis for establishment of the margin of safety inherent in the design, to resist the specified seismic hazards for the site.

Some additional comments, however, appear to be in order, in order to delineate the situation in more detail.

The supplementary information contained in Section D-2, 3, of Amendment 20/21, in the un-numbered pages in which Table I appears, now seems to be an acceptable method of defining a Response Spectrum analysis. The method described is referred to by the applicant, in Section D, page 4, under "B. Dynamic Analyses," as involving the calculations separately for each mode of the inertia forces, and computing the final inertial loading by taking the square root of the sums of the squares of the modal inertia forces. The applicant further describes the calculation of the internal moments and stresses as being computed by the usual structural analysis techniques from the resultant inertia forces. This method is described by the applicant as Method 1 and referred to as being presented in the answer to Question 7.9 of Amendment 7/8.

This is a revision from the previous method used in which comments, made in specific answer to Question A.2 of Amendment 13, describe the method as involving the calculation of the square root of the sums of the squares of the modal deflections and then multiplying the resultant deflection so obtained by the stiffness matrix to obtain the seismic forces or inertial forces for the computation of moments and shears. The new Method 1 described in Amendment 20/21, although not always acceptable, is usually conservative if proper attention is given to the directions of the resultant seismic forces.

Furthermore, it is supplemented by Method 2 described as the computation of the moments and stresses independently for each mode and then combined by using the square root of the sums of the squares of the modal values.

Comparison of these two methods assures reasonable and conservative values of the resultant seismic stresses, even when Method 1 is not properly applied.

The applicant points out, in Amendment 20/21, one instance in which the resultant stress is somewhat above the yield point allowable value. This is listed in Table 1 under Item 5, LPCI Pump Suction System, where the combined stress, including the Design Basis Earthquake stress, is 40,173 psi vs the yield point of 35,000 psi. A recalculation by the applicant of the resultant stress by calculating first the sum of the moment components and then the stresses, rather than summing the stresses, results in a stress of 37,124 psi which is only 6% beyond the yield point value. Based on the argument presented in pages 3 and 4 of the Amendment, this appears to be acceptable.

A minor point requires mention, at least. In sheets 15 through 20, under heading D-2, 3, in the revision marked 10/15/69 of Amendment 20/21, reference is made to the method of analysis discussed in the response to Question 2.9 of Amendment 7/8, where it appears that the method presented therein is now called, for piping, Method 2. Since Method 1 for structures and equipment, as redefined and newly described in Amendment 20/21 is the same as Method 2 for piping, this is bound to lead to confusion on the part of the reader.

With the exception of this minor point, and based on the fact that the applicant appears in Amendments 20/21 to have met the conditions agreed to in the conference on 3 September 1969, we now state that the design

appears to be adequate in terms of provision for safe shutdown for the Design Basis Earthquake and to withstand otherwise the effects of an earthquake of half this intensity.

