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April 7, 1986

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 2 and 3
Use of ASME Code Case N-411
NRC Docket Nos. 50-237 and 50-249

- References (a): Letter from J. R. Wojnarowski to H. R. Denton dated April 1, 1986.
- (b): Letter from J. R. Wojnarowski to H. R. Denton dated September 30, 1985.
- (c): Letter from E. G. Adensam to D. L. Farrar dated April 1, 1986.

Dear Mr. Denton:

On April 1, 1986, Commonwealth Edison Company issued Reference (a) to describe recently identified concerns regarding a re-analysis of the seismic loads for snubbers supporting the Recirculation Pumps for Dresden Units 2 and 3. This letter also documented that we had demonstrated compliance with FSAR requirements for the Safe Shutdown Earthquake (SSE) for the Dresden Unit 2 recirculation pump supports using damping values from ASME Code Case N-411. The NRC Staff verbally concurred with the use of the damping values from ASME Code Case N-411 for this particular application during a conference call on March 25, 1986. Reference (a) documented that conversation.

During a subsequent conversation on April 2, 1986, Messrs. B. D. Liaw and R. LaGrange of your Staff expressed concerns that advanced analytical techniques from our September submittal (Reference (b)) were used in conjunction with ASME Code Case N-411. They stated that their previous concurrence had assumed FSAR methodologies would be used with N-411 damping. They also questioned whether FSAR seismic spectra or spectra resulting from the Systematic Evaluation Program (SEP) should be utilized for this evaluation, and indicated that they would pursue this question within the NRC Staff.

In response to the Staff's concerns regarding analytical techniques, Commonwealth Edison Company reanalyzed the Recirculation System piping using N-411 damping with FSAR methodologies and requirements. This reanalysis confirmed the original conclusion that the Recirculation Pump supports meet FSAR requirements for the SSE. The reanalysis also confirmed that the first analysis, which used N-411 damping plus certain techniques from Reference (b), was conservative with respect to the analysis using N-411 damping plus

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FSAR requirements. The results of these two analyses are documented in Attachment A and were discussed with Messrs. Liaw and LaGrange on April 3, 1986. During that conversation, Mr. Liaw again questioned the use of the FSAR seismic ground spectra rather than the seismic ground spectra developed during the SEP seismic re-evaluations performed for Dresden Unit 2. He stated that, since Dresden Unit 2 is an SEP plant, concurrence with the Recirculation Pump support evaluations should be pursued with staff members who are responsible for SEP.

During the April 3 conversation, Commonwealth Edison Company indicated that the Recirculation Pump supports were also being evaluated on Dresden Unit 3. Mr. Liaw stated that the Staff concurred with the use of ASME Code Case N-411 in conjunction with FSAR requirements for the Dresden Unit 3 evaluations provided that these evaluations are consistent with the conditions described in References (a) and (c). Attachment B enumerates these conditions, and describes how they are satisfied by the Dresden Unit 3 evaluations of the Recirculation Pump supports.

Subsequent to the conversation with Messrs. Liaw and LaGrange, Commonwealth Edison Company contacted Mr. J. Zwolinski, Director of BWR Project Directorate No. 1, to discuss the questions regarding seismic ground spectra for Dresden Unit 2. Mr. Zwolinski agreed that the question of whether FSAR or SEP ground spectra should be used to evaluate compliance with the design bases is a larger issue which should be addressed at a later date during conversion of the Dresden Unit 2 Provisional Operating License into a Full Term Operating License. He also concurred that SEP seismic requirements are not the basis for determining operability of Dresden Unit 2 at this time. Accordingly, he agreed that the Recirculation Pump supports meet FSAR requirements based on the analysis using N-411 damping with FSAR techniques and FSAR spectra. He indicated that this evaluation was acceptable in light of the Staff's concurrence with similar applications on Dresden Unit 3 and LaSalle Units 1 and 2.

The Dresden Unit 2 evaluation, using N-411 damping is similar to the applications at Dresden 3 and LaSalle. The same piping system is analyzed in both Dresden units, namely the Recirculation System, using similar analytical models. The major difference between these Dresden models is that the crossover piping from Loop A to Loop B has been removed on Dresden Unit 3. Further, the analyses for all units, including Dresden 2, satisfy all of the conditions described in References (a) and (c) regarding the use of N-411 damping for piping sections. Based on these correlations to similar applications, Mr. Zwolinski further concurred with returning Dresden Unit 2 to service following its current outage, and stated that the Recirculation Pump support evaluation is satisfactory for continued operation.

Following this telephone conversation, Mr. Zwolinski confirmed the above conclusions with Mr. C. Grimes from the Integrated Safety Assessment Project Directorate. Mr. Grimes also felt that the relationship between SEP

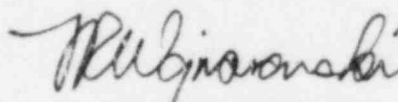
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seismic requirements and the FSAR needs to be ultimately resolved. Regarding this issue, it is Edison's position that the current design basis for seismic analyses and qualifications is as described in FSAR Section 12.1.1.3. It is our understanding that the SEP seismic evaluations were intended to assess safety margins available in plants designed prior to promulgation of the current seismic regulations. Accordingly, we believe SEP requirements do not replace the FSAR as the plant design basis. We believe that the final resolution of the relationship between SEP evaluations and the design and licensing basis for the plant will be resolved upon completion of the Systematic Evaluation Program and in conjunction with the conversion to a full term operating license.

This letter is being provided as requested by Mr. Zwolinski to document the evaluations performed in support of continued operation of Dresden Unit 2. We request your concurrence that the use of ASME Code Case N-411 is acceptable for this application when it is applied in conjunction with FSAR requirements and spectra, and when it is used within the limitations described in Attachment B. We are available for continued conversations with your Staff regarding the SEP requirements and the plant design basis as described in the FSAR. Any SEP requirements that are ultimately concluded to be appropriate licensing basis requirements would be documented in revisions to the updated FSAR such that the original and updated FSAR continue to reflect the licensing basis for Dresden Unit 2.

If you have any further questions regarding this matter, please contact this office.

Very truly yours,



J. R. Wojnarowski
Nuclear Licensing Administrator

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Attachments

cc: J. A. Zwolinski - NRR
B. D. Liaw - NRR
R. A. Gilbert - NRR
J. J. Harrison - Region III
Region III Inspector - Dresden

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ATTACHMENT A

DRESDEN UNIT 2 --- COMPARATIVE ANALYSES

The purpose of this attachment is to summarize two analytical techniques used to evaluate the Recirculation Pump supports on Dresden Unit 2. The model shown in Figure 1 was used for each analysis. Essentially, this model consists of two pumps, four major risers, two loop headers, and crossover piping between the Loops A and B headers. Boundary conditions for this model were as follows:

- Anchored at the Reactor Vessel (12 places)
- Supported with snubbers on both loops and the discharge risers (4 places)
- Supported at six points on each pump with six snubbers and three constant hangers

Each Recirculation Pump was modeled as shown on Figure 2. These pumps were included in the piping model in order to obtain pump snubber loads. A lumped mass model of the pump was used with masses distributed along the length of the model to most accurately distribute loads into the pump supports. The pump, as modeled, has a least natural frequency of approximately 25 hertz. Thus, the pump does not respond within the range of frequencies affected by Code Case N-411 (i.e., 0 to 20 hertz).

Both analyses used the same FSAR/N-411 spectra as input. Analytical techniques used for each of these methods are summarized below.

Method A -- N-411 plus FSAR

All FSAR analysis techniques, with the exception of N-411 damping, were followed for this option. This method reflects the current design basis for Dresden Unit 2. Those techniques corresponding to Method A are listed below.

- i) PVRC damping (ASME Code Case N-411)
- ii) Modal combination by SRSS
- iii) Direction combination using the largest horizontal response added absolutely with the vertical.
- iv) Dynamic analysis of all modes up to 33 hertz.
- v) Enveloped spectra for the piping center of mass.
- vi) FSAR stress criteria.

Method B -- N-411 plus September submittal

The techniques used for this analysis were consistent with the September submittal, Alternate 2, Piping Analysis Option (c), with one exception. Technique (c)vii (peak shifting) was not used. Those techniques that were used are as follows:

- i) PVRC damping (ASME Code Case N-411)
- ii) Modal combination by SRSS
- iii) Direction combination by Regulatory Guide 1.92.
- iv) Modal analysis to 33 hertz, with higher frequency effects.
- v) Enveloped spectra for the piping system.
- vi) FSAR stress criteria.

Results from these two analyses are provided in Table A-1. These results show that Method B, the September submittal, is more conservative than Method A which is the current design basis.

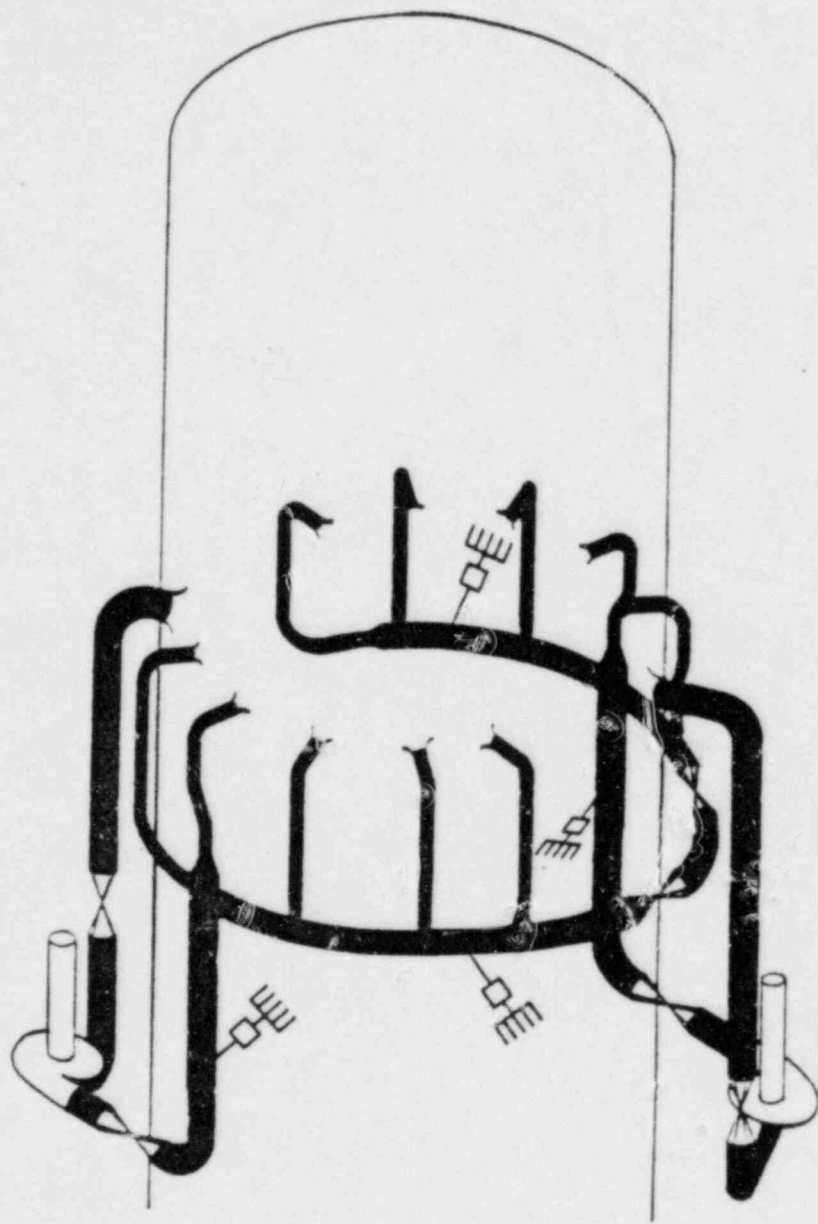
TABLE A-2

COMPARATIVE ANALYSIS RESULTS

<u>ITEM</u>	<u>METHOD A</u> <u>(FSAR/N-411)</u>		<u>METHOD B</u> <u>(submittal/N-411)</u>	
	<u>Loop A</u>	<u>Loop B</u>	<u>Loop A</u>	<u>Loop B</u>
Pump Snubber Loads (k)				
-SS1	7	12	16	20
-SS2A	12	15	13	16
-SS2B	22	17	35	29
-SS3A	16	17	34	39
-SS3B	5	10	39	44
-SS4	14	9	22	14
Pipe Stresses (ksi) ¹		18		18
Pump Nozzle Loads (k, ft) ²				
- FX		8		12
- FY		8		10
- FZ		6		7
- MX		42		54
- MY		71		76
- MZ		48		56

1) Maximum stress from ASME Equation 9(e) which occurs at a different location with Method A versus B

2) Loop B discharge SSE inertial loads



DRESDEN 2
RECIRCULATION LOOP PIPING MODEL

Figure 1

ATTACHMENT B

CONDITIONS FOR ACCEPTANCE OF N-411 ON

DRESDEN UNITS 2 AND 3

Reference (c) to this letter documents the NRC Staff authorization to use ASME Code Case N-411 on LaSalle Units 1 and 2. Some specific conditions apply to its use, pending a revision to Regulatory Guide 1.61. These conditions are repeated below:

- (1) The application of the Code Case shall be limited to piping systems analyzed by the response spectrum method only.
- (2) The alternate damping criteria of the Code Case shall be used in their entirety in any given analysis. Mixed application of the Code Case and Regulatory Guide 1.61 is not permitted.
- (3) Due to the increased flexibility of the system, the user shall check all recalculated displacements to verify there is adequate clearance between the piping system and adjacent structures, components, and equipment, and to verify the ability of mounted equipment to withstand the increased motion.
- (4) The user shall clearly indicate whether the Code Case will be used for new analyses, for reconciliation work, or for support optimizations.

Reference (c) contains one other condition for acceptance relative to application of N-411 damping for the Recirculation Pump Supports evaluations on Dresden Units 2 and 3. This additional condition stipulates that the Code Case is applicable only to piping sections. In other words, the NRC Staff does not consider N-411 damping to be applicable to major components. If major components are modeled with the piping, the applicability of Code Case N-411 to such a model will be determined by the Staff on a case-by-case basis.

Conformance to each of these conditions is demonstrated in the following paragraphs specifically for the Recirculation Pump Supports on Dresden Units 2 and 3.

Condition (1) - Response Spectrum

All dynamic analyses have been performed using standard, response spectrum methods.

Condition (2) - Consistent Damping Criteria

The seismic analyses use Code Case N-411, only. Other damping criteria, such as Reg. Guide 1.61, are not mixed with N-411 damping.

Condition (3) - Effect of Increased Flexibility

These analyses are being performed to evaluate seismic loads developed in the Recirculation Pump supports. The existing support system is being reconciled, so there is no change to the flexibility of that system. It is our understanding that this condition applies particularly to support optimization evaluations, which are not being done for this application.

Condition (4) - Application Purpose

As stated above, these evaluations are being performed only to reconcile the existing configuration. Code Case N-411 is not being used as the design basis for the recirculation pipe replacement effort on Dresden Unit 3.

Additional Condition - Major Components

Attachment A discusses the Dresden Unit 2 model and provides justification for including the Recirculation Pumps in the N-411 evaluation. The same justifications apply to the Dresden Unit 3 model. As for Dresden Unit 2, the Dresden Unit 3 pump model has a fundamental natural frequency beyond the range of frequencies influenced by Code Case N-411.

Based on the above discussion, Commonwealth Edison feels that the use of ASME Code Case N-411 is appropriate for application to the Recirculation Pump supports on Dresden Units 2 and 3.