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April 1, 1986

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

Subject: Dresden Station Unit 2
Use of ASME Code Case N-411
NRC Docket No. 50-237

Reference: Letter from J. R. Wojnarowski to H. R. Denton
dated September 30, 1985.

Dear Mr. Denton:

The purpose of this letter is to document a telephone conversation held on March 26, 1986 with Mr. R. LaGrange and others of your staff. In that discussion, Commonwealth Edison Company requested concurrence to use ASME Code Case N-411 for analysis of the Recirculation System piping on Dresden Unit 2 as described below.

In conjunction with the Dresden Unit 3 Recirculation Pipe Replacement, the recirculation piping system was re-evaluated for seismic loads using current analysis methods and criteria. This evaluation identified Safe Shutdown Earthquake (SSE) loads on structural elements supporting the recirculation pumps that exceeded the original seismic design loads. Each of the two recirculation pumps is supported by six snubbers which transmit seismic loads into either the shield wall or structural steel framing. An evaluation using conservative techniques indicated that minor structural modifications would accommodate the increased loads. These modifications have been initiated on Unit 3. For Unit 2 which is currently operating, additional analyses using Code Case N-411 damping show that the system would perform its intended function under SSE loads without modifications. These additional analyses were performed in accordance with the criteria/methodologies described in the referenced submittal which is under review by your staff.

The NRC Staff concurred with the use of ASME Code Case N-411, subject to justification for the system as modeled in the seismic analysis. In particular, the NRC emphasized the N-411 is applicable only to piping systems. If major equipment is included in the analytical model, it must be demonstrated that the equipment damping effects are consistent with the

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intent of N-411. Commonwealth Edison Company provided sufficient justification during the telephone conversation, and received Staff concurrence to use N-411 in the seismic analysis of the Dresden Unit 2 Recirculation System. This justification is provided in the following paragraphs.

Figure 1 is an isometric of the Recirculation System piping on Dresden Unit 2. The piping system essentially consists of two pumps, four major risers, two loop headers, and crossover piping between the two loop headers. This system was modeled with the following boundary conditions:

- Anchored at the Reactor Vessel nozzles (12 places).
- Supported on both loops and the discharge risers as shown on Figure 1. These supports are axial only.
- Supported at six points on each pump (see Figure 2). There are six snubbers and three constant hangers on each pump.

The Recirculation Pumps were modeled as shown on Figure 2. These pumps were included in the piping model in order to obtain pump snubber loads. Mass points were positioned along the length of the pump model to most accurately distribute loads to those snubbers. The pump, as modeled, has a least fundamental frequency of approximately 25 hertz. This frequency is largely due to the assumed flexibility of the pump snubbers.

The central concern of the NRC Staff was whether or not the damping contribution from the pump would be consistent with the intent of the Code Case N-411. Code Case N-411 specifies a damping versus frequency curve for piping systems, in which 5% damping applies for frequencies up to 10 hertz, and 2% for frequencies greater than 20 hertz. Between those two frequencies the damping is linear (e.g., 3-1/2% at 15 hertz). Basically, the Staff requires that the composite damping of the piping/pump system should be consistent with the N-411 damping curve. One way to demonstrate this is to show that the pump does not respond to frequencies below 20 hertz.

Based on the high fundamental frequency of the pump model (25 hertz), it can be concluded that the pump does not respond at frequencies below 20 hertz. To further confirm this, the mode shapes were reviewed. As expected, the pump does not have an individual response at modes below 20 hertz. Essentially, the pump acts like a rigid, lumped mass such as a valve. Code Case N-411 was developed from tests in which valves were included as in-line components.

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Based on the above discussion, Commonwealth Edison feels that the use of ASME Code Case N-411 in this application was appropriate. Pending completion of your review of our referenced submittal, we request you document your concurrence with the application of Code Case N-411 in this situation. A response is requested by April 7, 1986.

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

Very truly yours,

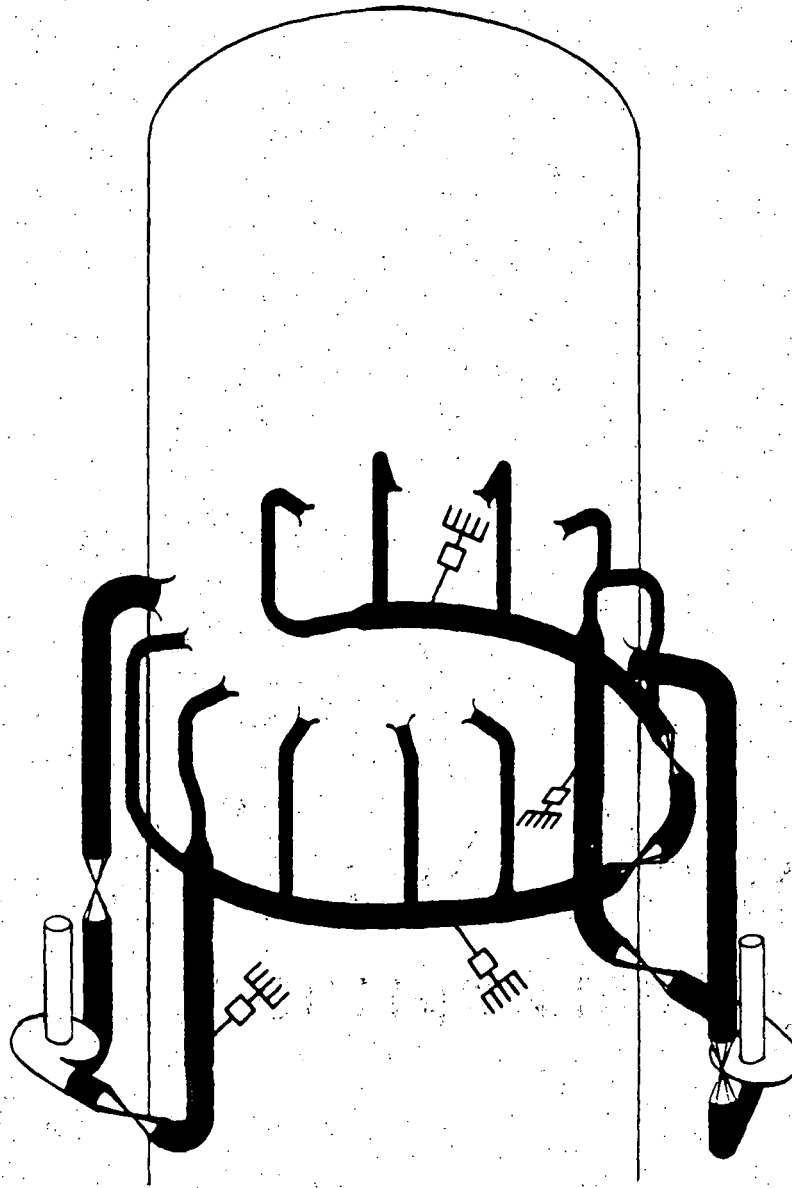


J. R. Wojnarowski
Nuclear Licensing Administrator

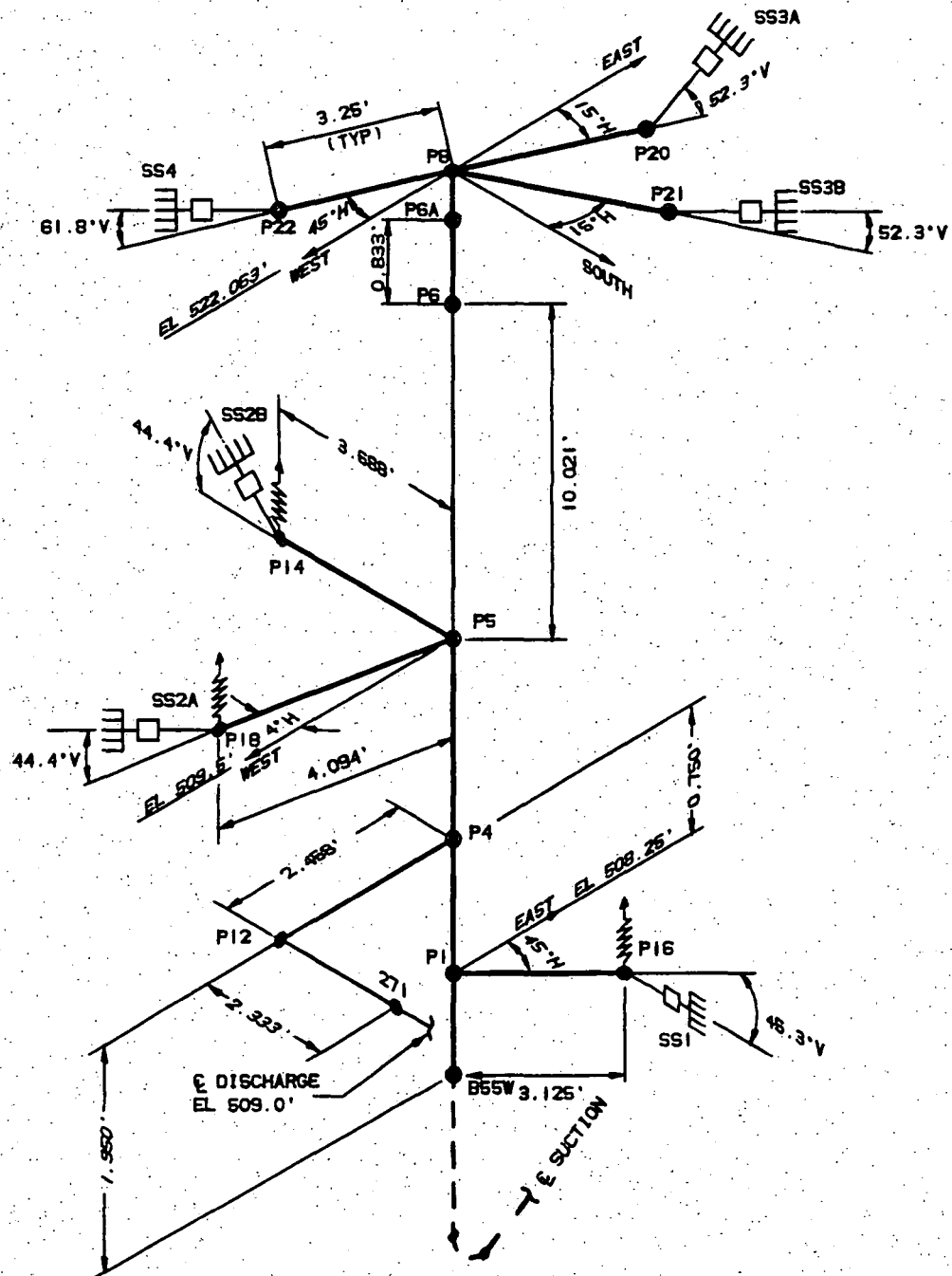
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cc: R. Gilbert - NRR
NRC Resident Inspector - Dresden

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**DRESDEN 2
RECIRCULATION LOOP PIPING MODEL**



PUMP MODEL LOOP B
 (LOOP A TYPICAL)