Commonwealth Edison Company
1400 Opus Place
Downers Grove, IL 60515

August 14, 1995

ComEd

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attn: Document Control Desk

Subject: Additional Information Regarding Response to Request for Additional Information (RAI) pertaining to TRANFLO

Reference: D. Lynch letter to D. Farrar transmitting Request for Additional Information data August 3, 1995, regarding the Pending License Amendment to Revise the Byron Unit 1 and Braidwood Unit 1 Technical Specification Amendment Related to Steam Generator Tube Voltage Based Repair Criteria

The Referenced RAI, transmitted to Commonwealth Edison Company (ComEd) the Nuclear Regulatory Commission (NRC) concerns/questions regarding acceptance of the TRANFLO code for use in predicting the TSP pressure loads during a Main Steam Line Break (MSLB) event for the Byron and Braidwood Unit 1 steam generators.

The purpose of this letter is to:

1. Clearly state the basis for the ComEd conclusion that a 3D analysis is not required to support the 3 volt IPC request.

2. Clearly state the basis why the current level of validation of TRANFLO is appropriate.

3. Explain why the application of a factor of 2 on load predicted by the TRANFLO code is conservative.

4. Put the load margin applied the TRANFLO predictions in perspective with other requirements and margins conservatively applied to the 3 volt IPC amendment.

The following details ComEd's position:

1. <u>3D Analysis</u>

   ComEd's review of this issue concluded that the peak load (pressure drop) occurs in the very early part of the transient (in less than one second), and is primarily driven by inertial flow considerations. The time of the peak load is too short for the migration of voids to permit asymmetric load; therefore, we have concluded that the flow can be adequately described and quantified by a one dimensional model.

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2. The Level of Code Validation

Recent questions from the NRC are focused on benchmarking TRANFLO against experimental data. Since the receipt of the RAI, ComEd has provided the NRC preliminary information which demonstrates that TRANFLO will adequately predict pressure behavior during blowdown events.

The NRC has requested in-vessel structural loads from tests. A review of industry data has not found such information. The applicable data to the problem appears to be the Marviken blowdown test data and other blowdown tests performed by General Electric, Battelle Northwest and Battelle Institute, Frankfort/Main, but this data focuses on critical flow prediction, vessel pressure response, and void fraction prediction. Although this data does not provide direct in-vessel measurement of loads, TRANFLO and other codes have been validated against the available test data. The critical factor is that the change in pressure across the support plate is the source of the load on the support plate. The relationship between Δ P and loads is well known; therefore it is believed that the application of pressure drop data to calculate loads on structures such as support plates is appropriate.

3. Load Factors

Based upon these considerations, ComEd and Westinghouse believe that the margin applied to the loads in WCAP-14273 is appropriate and conservative. The uncertainty of the prediction of two phase fluid flow effects is approximately 20% as validated by RELAP5. At the time of the peak loads, the flows are bubbly flow which generally is more accurately characterized by any 2 phase code. The loss coefficients of the TSPs are based on "handbook" values. Use of handbook values is normally verified by sensitivity studies ranging to about +/- 10%. There is no need to add additional margin to cover postulated 3D loads, since no asymmetric behavior is expected.

ComEd has performed an independent verification of the pressure drops using the RELAP5 computer code, obtaining consistent (within 15%) matches to Westinghouse results. ComEd can make its RELAP5 verification work available to NRC along with the input decks. This verification is in addition to the validation performed using Multiflex as described in WCAP-14273. In conclusion, the anticipated uncertainty in the existing analysis is approximately 25-30%. ComEd has doubled the loads three times the uncertainty.

4. Load Margi.

The analysis provided to support the 3.0 IPC amendment contained within WCAP-14273 addresses the issue of loads on each element of the TSP load path to assure displacement of any portion of the TSF will be <0.1". Analysis of the tie rods concludes: 1) the rods remain in the elastic regime and 2) the margin to plastic deformation is at least a factor of 6.8. Analysis of loads applied to the tie bars and welds indicates the stress at the welds with MSLB is <3 ksi (WCAP-14273 Table 8-12) with an allowable stress intensity of 19.5 ksi. Therefore, the margin is a factor >6.5. This predicts a minimum margin under MSLB of 13.6 times the load (2x6.8=13.6) for the tie rods and a margin of >13 times the load (2x6.5=13) for the tie bar welds. In summary a factor of at least 13 inherently exists in load path. This is adequate to bound any TRANFLO uncertainty or structural integrity uncertainty.

To confirm that ComEd's approach is appropriate, we have initiated contacts with recognized experts. Discussion with S. Levy Inc. regarding these issues has resulted in their concurrence with ComEd's general approach.

ComEd remains committed to facilitating resolution of these issues and would welcome discussion focused on the appropriate margin to be applied to loads. ComEd believes through this evaluation, a margin of 13 or greater exists in the structure and is an appropriate conservatism.

Please refer any questions concerning this correspondence to this office.

Sincerely,

Denise M. Saccomando
Nuclear Licensing Administrator

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