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ESK-96-054

ComEd

April 9, 1996

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D.C. 20555

Subject: Quad Cities Nuclear Power Station, Units 1 & 2
Commonwealth Edison (ComEd) Response to NRC Request for Additional Information on April 4, 1996, Regarding Unit 2 Corner Room Steel Operability Evaluation

NRC Docket Nos. 50-254, and 50-265

References:

(A) August 1995 Quad Cities Units 1 and 2 Corner Room Structural Steel operability evaluation, including calculation No. QDC-0020-S-0055.

(B) April 1, 1996 letter ESK-96-041 from E. S. Kraft, Jr. of ComEd to the USNRC Document Control Desk.

(C) April 5, 1996 letter ESK-96-052 from E. S. Kraft, Jr. of ComEd to the USNRC Document Control Desk.

(D) ComEd Calculation 9200-EO-S, Pages 89.34 - 89.42

(E) Nutech File Number 28.0201.1111.31, Calculation for Pipe Support M-1611-32

During our April 4, 1996 telephone conference call you requested a formal response to the following questions regarding the operability evaluation of the Quad Cities corner room structural steel. Our response to these questions is provided below:

Question 1) Provide a clarification to the previous response to Item 4b in Reference 2. In your response include an explanation of stability loads and why they are applied.

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Response 1)

In the design of a primary beam which is laterally supported by other, secondary beams, pseudo stability loads are added to verify that the laterally supporting beams and their connections are stiff enough to laterally support the primary beams. A pseudo stability load is a preliminary design force used in the evaluation of secondary members that provide lateral support to primary compression and/or flexural members. This load is characterized as "secondary effect" because it is not a result of an external force or moment applied to the framing as in the case of a pipe hanger, floor live load, seismic inertial loads, etc.. It's sole purpose is to ensure that the stiffness of the brace is adequate to prevent excessive buckling or twisting of the primary framing member being laterally supported. A second order analysis (P-Δ effects) of the entire structural framing is another method of achieving the same result.

In an effort to simplify the design and still be confident of the stiffness of the bracing members, pseudo stability loads were used. The magnitude of the stability load is a function of the compressive force in the flange of the member being braced and is only applied to the brace and it's connections. Since it is not an externally applied force to the framing system, it is not considered in the overall frame analysis. In the attached sketch (Attachment 1), bracing member B2 is designed for the force required to laterally support beam B1.

Pseudo stability loads need not be combined with environmental loads (i.e. thermal, gravity, seismic) because they are, in effect, redundant relative to stiffness. If the size of a brace (that has been designed for stability loads) increases as a result of environmental loads, then the minimum requirements for stiffness are still satisfied without penalizing the design. The minimum stiffness of bracing members are verified by the use of this stability assessment, but these loads are not required to be included in load combinations.

The functionality evaluation calculations (Reference A) included the implementation of this approach as described above. In the functional calculations, the conservative load combinations (including the absolute sum of seismic plus stability loads) were refined by separating the stability evaluation from the seismic load combinations. This methodology is consistent with the applicable code and design basis requirements.

Question 2) Provide a list of load changes that have occurred, if any, between the 1991 Load Monitoring System (LMS) analysis and the assessment made in 1995.

Response 2)

We have performed a review of the load changes that have occurred since the 1991 LMS database was prepared. We have determined that there are no new hanger loads applied to the structural steel.

The 1991 LMS database was the initialization run which conservatively combined hanger loads which apply significant torsion to the structure with lower bound connection capacity values.

The resolution and resultant modifications to corner room steel currently being implemented, utilizes the heat exchanger reactions resulting from the Unresolved Safety Issue (USI) A-46 program. The final summary of the Seismic Qualification Utility Group (SQUG) walkdown program addressing USI A-46 is due in June 1996.

Question 3) Provide an example of a beam which had a high interaction coefficient that was caused by torsion, which could be reduced by relieving the rigid torsional moment. Include in this example, an evaluation that demonstrates how the torsional moment applied by the support is relieved.

Response 3)

During the call, your staff selected beam No. 2 (Table 2.2 of Reference B) from the Southeast corner room of Unit 1 as a critical case with high interaction coefficients (IC). We have prepared the detailed calculation (Reference D) for this beam and its critical connection that takes into account the conservatisms noted in the previous submittals and demonstrates the use of refined analysis techniques to reduce the interaction coefficients. The primary change incorporated into this calculation is the reduction in the torsion that is applied by a pipe support auxiliary steel. This reduced loading was provided by the piping analysis responsible organization in the form of a revised load summary report (See Reference E for back-up Calculations). This revised calculation is based on satisfying the functional review acceptance criteria, by applying Safe Shutdown Earthquake (SSE) loading (Reference A).

The preliminary interaction coefficients for the right end connection of beam 2 were 8.64 for angle bending and 8.50 for web bending under Operating Basis Earthquake (OBE) load combinations and 5.56 and 5.29 respectively for the SSE load combinations. With consideration of the reduction in torsion from the pipe support auxiliary steel the SSE IC's become 0.43 for angle bending and 0.51 for web bending. Since both IC's are less than the acceptance criteria, this revised calculation demonstrates that the functional stress limits are maintained.

This completes our response to your request for additional information on April 4, 1996.

To the best of my knowledge and belief, the statements contained in this document are true and correct. In some respects these statements are not based on my personal knowledge, but on information furnished by other Commonwealth Edison employees, contractor employees, and/or consultants. Such information has been reviewed in accordance with company practice, and I believe it to be reliable.

If there are any questions concerning this matter, or need for further clarification, please contact this office.

Sincerely,

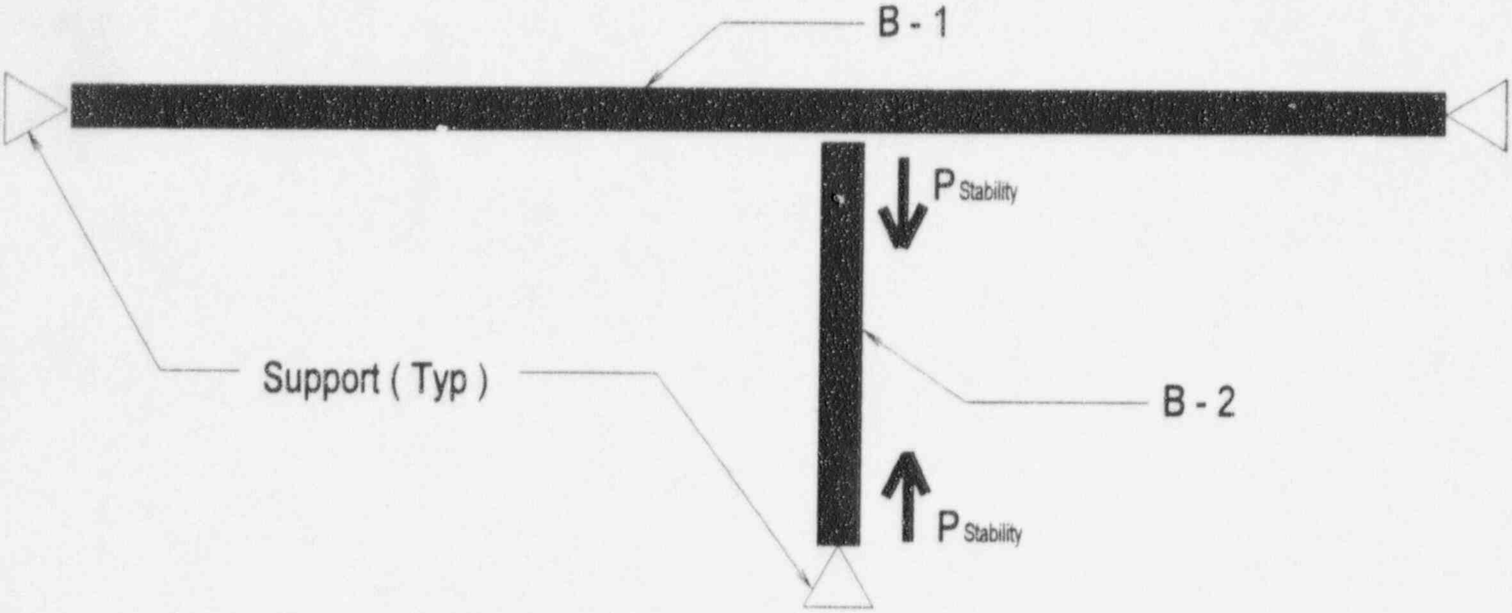
L.W. Pearce for

E. S. Kraft, Jr.
Site Vice President

Attachment: Stability load calculation sketch

cc: H. J. Miller, Regional Administrator - RIII
R. M. Pulsifer, Project Manager - NRR
C. G. Miller, Senior Resident Inspector - Quad Cities
D. C. Tubbs, R. J. Singer - MidAmerican Energy Company

Attachment No. 1 Stability Load Calculation Sketch



Stability Load Example For Beam #2