ATTACHMENT 12

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
COMMONWEALTH EDISON COMPANY	)	Docket Nos. 50-454 OL
	)	50-455 OL
(Byron Nuclear Power Station, Units 1 & 2)	)	
	)	

JOINT STATEMENT OF ROBERT W. MANZ AND WADE FAIRES

Introduction (Mr. Manz and Mr. Faires)

1. This statement addresses Findings 3-11 through 3-17 of the NRC Staff's Integrated Design Inspection (IDI) Report dated September 30, 1983, which was prepared by the NRC's Office of Inspection and Enforcement. Those findings concern piping design work that was performed by Westinghouse Electric Corporation. The IDI Team found certain deficiencies in the sample of this work that it inspected. Westinghouse design engineers reviewed these portions of the IDI Report and submitted draft responses to Commonwealth Edison Company (CECo). CECo personnel reviewed these drafts and submitted revised responses to the NRC IDI Team on December 30, 1983. This statement again addresses the specific deficiencies perceived by the IDI Team.

Finding 3-11: Pipe Damping Value (Mr. Manz)

2. The IDI Team concluded that Westinghouse's use of

a 4 percent damping value in the safe shutdown earthquake (SSE) analysis of piping of 12 inch diameter and greater is appropriate for Westinghouse supplied equipment (i.e., the reactor coolant loop) but is inconsistent with the FSAR as it is applied to the SSE analysis of the balance-of-plant systems.

3. The Westinghouse criteria establish a 4 percent damping value for SSE analyses of the Reactor Coolant System Piping which includes connected piping 12 inches or greater in diameter, a 3 percent damping value for piping 12 inches and greater in diameter which is not connected the Reactor Coolant System, and a 2 percent damping value for piping of less than 12 inches in diameter. In light of the concern expressed in the IDI, the FSAR has been amended to clarify the use of the 4 percent damping factor. The table in the FSAR applicable to Westinghouse now prescribes the use of a 4 percent damping value for SSE analysis of the reactor coolant loop and piping subsystems of 12 inch diameter and greater which are attached directly to the reactor coolant loop. For other piping subsystems 12 inches and greater, the Westinghouse table now prescribes use of a 3 percent damping value. To ensure that the damping values used were consistent with the revised table, Westinghouse reviewed the SSE analyses of all 521 subsystems within its scope of analysis. The SSE analyses of only 2 subsystems was found

to have used the inappropriate damping values. These two subsystems were reevaluated and the existing design was found to be acceptable.

Finding 3-12: Spray Additive Tank Calculation (Mr. Manz)

4. Finding 3-12 indicates that there is poor document control because a preliminary calculation was not noted as preliminary, voided or revised when final evaluations were performed.

5. As a general practice, Westinghouse routinely marks a calculation as revised or voided when a subsequent evaluation is performed. However, document control procedures of the Westinghouse Quality Assurance Program did not require any such action. To assure that our practice of marking calculations as revised or voided is consistently applied, the Westinghouse Procedure and Guideline Manual for the Byron Project has been revised to direct such action when appropriate.

6. In the instance cited in Finding 3-12, the final calculations appear in the same section of the analysis notebook as the initial calculations. Thus, the initial calculation was readily discernable as outdated. Nonetheless, that calculation has since been marked as superseded.

7. In any event, the failure to mark the initial

calculation as preliminary would not have any effect on design because of checks in the iterative design process. These steps include independent engineering review of calculation, internal audits against QA procedures, and review of analytical results at 70 percent and 100 percent as-built stages.

Finding 3-13: Pipe Movement in Relation to Gap Clearance (Mr. Manz)

8. Finding 3-13 asserts that the calculations that were performed to confirm the piping displacements at two wall penetrations did not include the calculation of vector displacement. Therefore, the IDI Team concluded that the calculations failed to verify the modeling assumption of no interference between the piping and the penetration walls.

9. We disagree with the IDI Team's conclusion that the calculations were insufficient to verify the modeling assumption. The pipe displacements were all less than two-thirds of the gap size. Thus, the analyst who performed the piping lateral displacement calculations was able to determine by inspection that the last step of calculating the vector displacement was unnecessary since it was obvious from the magnitude of the displacements that the vector sum would be smaller than the wall penetration gap. Therefore, the assumptions used in the model were verified adequately based on the calculation as originally performed. A sub-

sequent calculation of the vector displacement confirmed the analyst's judgment that the vector sum were less than the wall penetration gap.

10. At the time the IDI Team made Finding 3-13, Westinghouse was already in the process of developing a systematic review of all penetrations. For this review, we developed a standardized calculation form which includes a calculation of the vector sum. This systematic review has been implemented and has been completed.

Finding 3-14: Branch Line Analysis (Mr. Manz)

11. The IDI team reviewed the calculations that evaluated two small branch lines off the main piping system which were not included in the mathematical model. The team apparently did not feel that the methodology used in these calculations was sufficiently detailed to support seismic qualification of the lines.

12. We disagree with the conclusion that the seismic qualification of these lines is not adequate. In this case the analyst chose to use a simplified, conservative method for evaluating these lines instead of a more detailed calculation similar to the IDI recommendations. Use of such simplified methods is a typical engineering practice. If such a conservative calculation yields unacceptable results, a more detailed calculation is performed. To demonstrate

the conservatism of the initial analysis, a more detailed evaluation was performed as recommended by the IDI Team. This resulted in calculated stresses approximately a factor of 3 lower than the simplified results.

13. Typically, these branch lines are included as part of the main piping models. Separate hand calculations are performed in cases when they are not included with a main piping model. As demonstrated above, the hand calculations which were performed prior to the IDI result in conservative values of pipe stress. Furthermore, to ensure unformity in this type of evaluation, standard methods similar to those recommended by the IDI are now incorporated into the Westinghouse Procedure and Guideline Manual for the Byron Project.

Finding 3-15: Hanger Dimension (Mr. Faires)

14. The IDI Team found that there was a discrepancy between the piping isometric drawings and the support drawings involving the location of two pipe supports.

15. Discrepancies between Hunter piping isometric drawings and Westinghouse support designs do occur in the design process. However, these are expected and are resolved systematically through the 100% as-built program.

16. When the construction work is 100% complete, CECo

issues 100% as-built packages to Westinghouse, containing the isometric drawings with the as-built support locations identified. Westinghouse site personnel review all 100 percent as-built packages to verify the correctness of all documentation. Information on support drawings showing locations of the supports is compared to the corresponding information on the as-built isometric drawings. CECo is notified of any deviations or discrepancies in the as-built dimensions and proceeds with further verification and, if necessary, corrective action. This process had not been completed at the time of the IDI for the hangers in question, but has since been completed.

17. For the specific instance cited in Finding 3-15, field personnel verified the supports' location. In both cases, the information on the Westinghouse design documents was correct. There were no violations in documentation nor any design deficiencies. Commonwealth Edison has been notified of the discrepancy on the Hunter Isometric drawing and the isometric drawing has been reissued.

Finding 3-16: U-Bolt Analysis (Mr. Faires)

18. The IDI team found that the calculations for a particular support revealed that a cantilever angle section and a U-bolt were overstressed. A letter to the Westinghouse site personnel indicated that a modification of the angle

was required, but not a corresponding modification of the U-bolt. A decision not to modify the U-bolt was not supported by calculations at the time of the IDI.

19. The support referred to in the finding required a modification because it was overstressed. For all supports that require modifications, support calculations are completely verified in the field before the modification is implemented. In addition, after the modification is completed, CECo issues a revised 100 percent as-built package to Westinghouse and the calculations are completely reverified again by the design engineer. In the event the field Engineering Change Notice (ECN) does not resolve the design deficiencies the process is repeated. This verification cycle in the design process with regard to the particular support identified had not been completed at the time of the IDI.

20. At the time of the inspection, support verification had indicated an overstressed condition of both the angle and the U-bolt. As the IDI Team pointed out, the letter informing the field personnel of the need for support modifications reflected the overstressing of the angle but not the overstressing of the U-bolt. However, for supports indicated as needing modifications, a complete calculation reverification is done and an ECN is then issued. In this instance, this

included the U-bolt as well as the angle. Once the calculation review is complete, the field engineer decides whether it is more feasible to modify the existing support configuration or to design a new one. At the time of the Staff's inspection it was believed that the design of the U-bolt was appropriately conservative. However, at that time the calculation verification had not yet been performed and the ECN had not yet been issued. After the calculation was performed, the field engineer determined that the most feasible modification would be to replace the angle with a tube steel section and to replace the U-bolt with a frame of angle sections around the pipe. A field ECN reflected these modifications. After the modification was completed, the design engineer confirmed that it incorporated all necessary changes to confirm structural adequacy. Finally, a review of the U-bolt calculation has been completed and documented since the IDI, and no changes in the U-bolt would have been required.

Finding 3-17: Piping Response for Changed Span Length (Mr. Manz)

21. The IDI Team concluded that the use of hand calculations, rather than computer reanalysis, to evaluate the effects on the piping system of the relocation of a particular support was not adequate for seismic qualification.

22. The method used to evaluate the effect of the support relocation is fully acceptable. The assessment included load increases of 40 percent on the moved vertical support (004) as well as the two adjacent vertical supports (001 and 005). Although a precise prediction of the effect of this relocation would have required a computer reanalysis, the use of a hand calculation was deemed appropriate in this case in view of the limited changes from the analyzed configuration, the large margins in the pipe stress, tank nozzle loads, and valve accelerations, the conservative nature of the hand calculations, and engineering judgment based upon experience with such analyses.

23. Nonetheless, to verify the adequacy of the assessment made in this reconciliation process, an SSE computer reanalysis was conducted with the support relocation included. This resulted in SSE support load changes of -15 percent, +20 percent, and +33 percent from the original analysis for supports 001, 004, and 005, respectively. Therefore, the +40 percent increase which was estimated for all three upports was indeed conservative. Reanalysis of the piping subsystem, with the support location deviation included, demonstrated that the estimated support load increases were conservative, and justified the simplified analysis used in the original evaluation.

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CERTIFICATE OF SERVICE

The undersigned, one of the attorneys for Commonwealth Edison Company, certifies that he filed the original and two copies of the attached "COMMONWEALTH EDISON COMPANY'S ANSWER TO INTERVENORS' MOTION TO REOPEN THE RECORD" with the Secretary of the Nuclear Regulatory Commission and served copies on the persons and at the addresses shown on the attached service list. Unless otherwise noted on the Service List, service on the Secretary and all parties was made by deposit in the U.S. Mail, first-class postage prepaid, this 2nd day of October, 1984.

Joseph J. Gallo
One of the Attorneys for
Commonwealth Edison Company

ISHAM, LINCOLN & BEALE
Three First National Plaza
Chicago, Illinois 60602
(312) 558-7500

SERVICE LIST

COMMONWEALTH EDISON COMPANY -- BYRON STATION
Docket Nos. 50-454 and 50-455

*Ivan W. Smith, Chairman
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
4350 East West Highway
West Tower - Room 428
Bethesda, Maryland 20814

*Dr. A. Dixon Callihan
Administrative Judge
102 Oak Lane
Oak Ridge, Tennessee 37830

*Dr. Richard F. Cole
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
4350 East West Highway
West Tower - Room 428
Bethesda, Maryland 20814

Joseph Gallo, Esq.
Isham, Lincoln & Beale
Suite 840
1120 Connecticut Avenue, N.W.
Washington, D.C. 20036

Region III
U.S. Nuclear Regulatory Commission
Office of Inspection & Enforcement
799 Roosevelt Road
Glen Ellyn, Illinois 60137

Ms. Betty Johnson
1907 Stratford Lane
Rockford, Illinois 61107

Ms. Diane Chavez*
SAFE
528 Gregory Street
Rockford, Illinois 61108

Dr. Bruce von Zellen
Department of Biological Sciences
Northern Illinois University
DeKalb, Illinois 60115

**Douglas W. Cassel, Jr.
BPI
109 N. Dearborn St.; Suite 1300
Chicago, Illinois 60602

Mrs. Patricia Morrison
5568 Thunderidge Drive
Rockford, Illinois 61107

*Mr. Stephen Lewis
Office of the Executive
Legal Director
U.S. Nuclear Regulatory Commission
7735 Old Georgetown Road
Room 9604
Bethesda, Maryland 20814

Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Atomic Safety and Licensing
Appeal Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Docketing and Service Section
Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Howard A. Wilbur
Administrative Judge
Atomic Safety and Licensing Board
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dr. Reginald L. Gotchy
Administrative Judge
Atomic Safety and Licensing
Appeal Board
U.S. Nuclear Regulatory Commission
4350 East West Highway
3rd Floor - call 492-7663
Bethesda, Maryland 20814

Alan S. Rosenthal, Chairman
Atomic Safety and Licensing
Appeal Board
U.S. Nuclear Regulatory Commission
4350 East West Highway
3rd Floor - call 492-7663
Bethesda, Maryland 20814

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