

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report Nos. 50-454/86009; 50-455/86008;
50-456/86011; 50-457/86009

Dockets No. 50-454; 50-455;
50-456; and 50-457

License Nos. NPF-37; CPPR-131
CPPR-132; and CPPR-133

Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, IL 60690

Facilities Name: Byron Station, Units 1 and 2
Braidwood Station, Units 1 and 2

Inspection At: Sargent and Lundy Engineers, Chicago, IL

Inspection Conducted: February 25 and 26, 1986

Inspectors: J. Muffett

J W Muffett

3/11/86
Date

J. Gavula
J. Gavula

3/11/86
Date

Approved By: *D. Danielson*
D. Danielson, Chief
Materials and Processes
Section

3/11/86
Date

Inspection Summary

Inspection on February 25 and 26, 1986 (Report Nos. 50-454/86009(DRS);
50-455/86008(DRS) 50-456/86011(DRS) 50-457/86009(DRS))

Areas Inspected: Announced special inspection of engineering allegations.
The inspection involved a total of 20 offsite inspector-hours by two NRC
inspectors.

Results: No violations or deviations were identified.

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DETAILS

1. Persons Contacted

Sargent and Lundy Engineers (S&L)

- *G. DeBoo, Supervisor EMD
- G. Kitz, Head EMD
- *T. Thorsell, Senior Electrical Project Engineer
- *W. Cleff, Project Director
- *G. Jones, Project Manager (Braidwood)
- *A. Marcos, Assistant Head, Q.A. Division
- *H. McCullough, Project Q.A. Coordinator
- *A. Dermenjian, Director, EMD
- D. Hoang, Engineering Specialist, EMD

*Denotes those attending the exit interview.

2. Allegation Follow-Up (RIII 86-A-0002)

The allegations addressed in the following paragraphs were received by mail in Region III on January 6, 1986. Two separate letters, sent anonymously from Chicago, Illinois, alleged that deficient calculations were performed by S & L's Engineering Mechanics Division (EMD) for the Byron and Braidwood Stations.

a. Allegation

(Closed) EMD utilized analysis data from reference points that were too far from impact locations under consideration in Pipe Clearance Report (PCR) calculations.

NRC Review

The NRC inspector reviewed all six of the analysis packages for the Byron Unit I PCR impact calculations. Similar calculations have not yet been performed for the Braidwood Units, therefore, this allegation could not apply to Braidwood. Out of the several hundred PCR calculations contained in the packages, 18 calculations were reviewed in detail to determine the appropriateness of nodal point utilization in the evaluations.

The following S & L packages were reviewed with the following observations:

- (1) EMD 049881 "Disposition of Piping Clearance Reports (PCRs)," Byron 1 and 2, May 2, 1985.
 - (a) PCR No. 1AF01 SEQ 2 - Impact parameters (Displacements and Accelerations) taken from a different nodal point than moment or stress data.
 - (b) PCR No. 1CC02 SEQ 45 - Impact parameters taken from different nodal points than stress data.

- (c) PCR No. 1CC02 SEQ 89 - Nearest nodal point used for impact data and stress data.
 - (d) PCR No. 1CC03 SEQ 87 - Nearest nodal point used for impact data and stress data.
 - (e) PCR No. 1FW01 SEQ 236 - Impact parameters determined from simplified frequency calculation based on response spectrum values.
 - (f) PCR No. FW-13 SEQ 3 - Impact parameters taken from nodal point 3'-2" from interference point.
 - (g) PCR No. 1MS-14 SEQ. 03 - Impact parameters taken from different nodal point than stress data.
 - (h) PCR No. 15X02 SEQ 12 - Impact parameters taken from different point than stress data.
 - (i) PCR No. 2CC15 SEQ 21 - Impact parameters taken from different nodal point than nearest node.
 - (j) PCR No. 2CC15 SEQ 44 - Nearest nodal point used for impact data and stress data.
- (2) EMD 049341 "Disposition of Pipe Clearance Reports for the cases in which the ratio of the seismic displacement of the target and the source are less than 0.2." Revision 00, August 15, 1984.
- (a) PCR No. 2D022 SEQ 08 - Impact parameters taken from different nodal point than nearest node.
 - (b) PCR No. 2FP15 SEQ 02 - Impact parameters taken from different nodal point than nearest node.
 - (c) PCR No. 1CC09 SEQ 13 - Impact parameters taken from different nodal point than nearest node.
- (3) EMD 050396 "Disposition Calculations for Westinghouse Related Clearance Reports" Revision 00, November 12, 1984 Addendum A.
- PCR No. 2SX17 SEQ 19 - Impact parameters taken from different nodal point than nearest node.
- (4) EMD 050388 "Disposition of 35 NPS Related Piping Clearance Reports" Revision 00.
- (a) PCR No. 2CC06 SEQ 14 - Impact parameters taken from nearest node.
 - (b) PCR No. 1AF15 SEQ 05 - Impact parameters taken from nearest node.

- (5) EMD 048319 "Disposition of Piping Clearance Reports (PCRS)"
Revision 00 July 27, 1984.
- (a) PCR No. 2FP03 SEQ 107 - Impact parameters taken from
closest node.
 - (b) PCR No. 1CC02 SEQ 100 - Impact parameter taken from
closest node.
- (6) EMD 050387 "Reactions Due to Seismic Interaction Between S & L
Piping and Structural Components" Revision 00.

No specific observations were made.

The above information was discussed with the S & L project engineer
responsible for this work and is summarized as follows:

The PCR project was performed in several phases. Initially,
pipe clearances reported from the field were correlated to
approximate locations on isometric drawings. Using this
information, math model nodes were chosen based on the maximum
displacements for the specific section of pipe in question. A
certain degree of uncertainty in the exact interference point
necessitated the use of this conservative approach.

If the PCR's could be dispositioned as "Acceptable" using this
information, no further refinement was required. If a potential
problem was found, additional information was requested from the
field. This "Phase II" work gave more accurate impact locations
and allowed the nearest nodal point as opposed to the most
conservative nodal point in the area to be used.

Three PCRs were reviewed to document this approach. Items 2.a., 2.b,
and 2.c above were verified through the as-built drawings for the
location of the impact point. All three PCR calculations were
determined to be correct in that respect.

Conclusion

This allegation was substantiated from the perspective that in many
cases the closest nodal point was not utilized in the impact calculation.
However, the reference points in question were chosen because of their
conservative data. Therefore, there is no technical basis for this
allegation. The methodology applied by S & L in resolving PCR impact
calculations was both logical and conservative. The use of this
methodology to resolve the PCR impact calculations would also be
acceptable for Braidwood.

b. Allegation

(Closed EMD utilized incorrect analytical methods for as-built
reconciliation of pipe stresses and anchor loads. A specific example
referenced support relocations reviewed by a named individual where
the induced moments from proximate supports were ignored.

NRC Review

The NRC inspector reviewed various analyses pertaining to reconciliation of as-built piping dimensions and support locations for the Byron Station. This reconciliation effort has not been initiated for Braidwood, therefore, this allegation could not pertain to Braidwood. All of the above analyses were reviewed by the named individual. It was determined during various discussions with S & L personnel that this individual's reviews were of a secondary nature and were not directly related to checking the accuracy of the calculations. The technical adequacy of the calculations was performed by engineers subordinate to this individual. Out of the several hundred reconciliation calculations performed, ten analyses were reviewed in detail to determine if any inappropriate analytical techniques had been utilized.

The following S&L calculations were reviewed with the following observations or comments:

- (1) EMD 030145 "Addendum to Stress Report," 2SX-46, Revision 03F0 - all supports installed within installation tolerances.
- (2) EMD 033273 "Byron 2 Addendum to Stress Report," 2SX 72 - no reconciliation calculations were performed.
- (3) EMD 036620 "Byron 2 Addendum to Stress Report," 2MS-16, Revision 00F0 - no reconciliation calculations were performed. A dimensional change outside of the guidelines in PI-BB-27 was written off by engineering judgement. This was acceptable.
- (4) EMD 039258 "Byron 2 Addendum to Stress Report," 2AF-07, Revision 00F0 - A support was relocated from 1'-0 to 3'-6". The basis for increasing the support loads was to compare this to a similar run with a support located at approximately 2'-0. Loads in this case doubled and on this basis the loads for the new location were assumed to increase by the same ratio (i.e., 3.5 times). There was no basis for this methodology.
- (5) EMD 037946 "Addendum to Stress Report," 2D0-01, Revision 00F0. No irregularities observed.
- (6) EMD 038762 "Addendum to Stress Report," 2FW-14, Revision 00F0. Support load increase factor was determined on a static basis only.
- (7) EMD 038753, "Addendum to Stress Report," 250-21, Revision 00F0. The reactions and moments were determined in all three directions. Seismic loads were based on peak response spectrum values. This was appropriate.
- (8) EMD 037949, "Addendum to Stress Report," 2FW-06, Revision 00F0. No comments made.
- (9) EMD 030708, "Addendum to Stress Report," 2AF-06, Revision 00F0. No comments made.

- (10) EMD 037742, "Addendum to Stress Report," 25X-12, Revision 00F0.
No reconciliation calculations required.

The above information was discussed with EMD management personnel, specifically with regards to items b.(4) and b.(6). No justification was given for the methodology described in item b.(4). It was generally agreed that the approach taken was inappropriate. However, it was concluded that due to the magnitude of the loads being addressed that this particular case would not result in an overstressed situation.

Item b.(6) was justified on the basis that the portion of the line in question was non-seismic and therefore, only static loads were analyzed. This was found to be acceptable.

Conclusions

The allegation concerning the specific example of as-built reconciliation improprieties could not be substantiated and is considered closed. However, one example was found where an inappropriate methodology was used. Since a limited number of calculations were reviewed by the NRC inspector, S&L committed to evaluate 30 additional calculations to determine if this was an isolated incidence or not. This is an unresolved item pending the NRC inspectors review of S&L's evaluation. (454/86009-01; 455/86008-01)

3. Unresolved Items

An unresolved item is a matter about which more information is required in order to ascertain whether it is an acceptable item, an open item, a deviation, or a violation. The unresolved item disclosed during this inspection is discussed in paragraph 2.b.(4).

4. Exit Interview

The inspectors met with representatives (denoted in Paragraph 1) at the conclusion of the inspection. The inspectors summarized the scope and findings of the inspections noted in this report. The inspector also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. No documents/processes were identified as proprietary.