

U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-454/84-67(DRS); 50-455/84-45(DRS);
50-456/84-26(DRS); 50-457/84-25(DRS)

Docket No. 50-454; 50-455;
50-456; 50-457

License No. CPPR-130; CPPR-131
License No. CPPR-132; CPPR-133

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

Facility Name: Byron Station, Units 1 & 2
Braidwood Station, Units 1 & 2

Inspection At: Sargent & Lundy Engineers, Chicago, Illinois

Inspection Conducted: September 4, 1984

Inspector: *D. H. Danielson*
J. W. Muffett

9/24/84
Date

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

9/24/84
Date

Inspection Summary

Inspection on September 4, 1984 (Report No. 50-454/84-67; 50-455/84-45; and 50-456/84-26; 50-457/84-25(DRS))

Areas Inspected: Special announced safety inspection to review calculations concerning the primary shield wall, the reactor pressure vessel shield wall, and the use of 1/4" concrete expansion anchors. This inspection involved a total of 9 inspector-hours by one NRC inspector.

Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

*T. Tramm, Nuclear Licensing

Sargent & Lundy Engineers (S&L)

*M. McCullough, QA Division

*R. W. Hooks, Assistant Head - Structural Engineering Division

A. Al-Dabbagh, Senior Engineering Analyst

J. N. Diebold, Senior Structural Engineer

*Denotes those attending the exit interview.

2. Allegation Concerning Primary Shield Wall and Reactor Pressure Vessel Shield Wall

a. Allegation

On February 14, and May 27, 1984 anonymous allegations concerning Sargent & Lundy design practices were received by the NRC. One of the allegations is summarized below. The remaining allegations have been addressed in a separate Region III inspection report (50-454/84-13; 50-455/84-09, Section II).

The individual alleged that the Byron plant was unsafe because of foundation problems, and the sacrificial shield foundation was weak by a factor of 50%. The alleged claimed the foundation would move, slide or crack in an earthquake of 4.5 on the Richter scale causing radiation to leak from the containment. The alleged knew that a S&L Division Head knew of the problem, but does not know what CECo was told. The design was made prior to Three Mile Island, but has since been checked by S&L. In checking the design S&L "fixed the books." The alleged stated that data for the sacrificial shield to foundation connection was manipulated to make the books look good. The alleged contended that the quantity of rebar in the sacrificial shield and foundation had been significantly reduced. According to the alleged a group of ten S&L engineers had informed S&L management of these problems. Allegedly, S&L fired one engineer and did not promote the others. The alleged claimed to have in his possession the original records of the manipulated data.

b. NRC Findings

In response to this allegation, inspections were conducted at Sargent and Lundy on April 25, and May 23, 1984. These inspections revealed the following four significant technical issues concerning the Primary Shield Wall and the Reactor Pressure Vessel Shield Wall.

- (1). In the seismic analysis of the Primary Shield Wall (PSW) and other walls in this area, the walls are assumed to act together as a unit (a single cantilever beam). This assumption is also used to apportion seismic loads among the various walls. No analysis is provided to justify this assumption.
- (2) In the thermal analysis of the PSW the affect of the constraint provided by these other walls is neglected (nonsymmetrical affect). This is nonconservative in regard to thermal stresses.
- (3) In the analysis of accident conditions on the PSW, the PSW is assumed to be on a "pinned base" (free to rotate). The angular displacement of the "pinned base" is then applied to the interior base mat. This is nonconservative because it neglects the stress produced by deflections which deviate from the "pinned base" assumption. (Thick shell affect.)
- (4) In the Reactor Presssure Vessel Shield Wall analysis, the connection between the top beams and the embedded plates is identified as "7% over stress under accident conditions." The analysis contains no justification or explanation as to why this condition is acceptable.

These issues were discussed with the licensee and its Architect/Engineer and was classified as an open item. At the close of the discussion the licensee committed to perform analyses to address these issues.

On September 4, 1984, the additional analyses were reviewed. The analyses are contained in the following documents:

- . SESD Calculation 4.3.1 which addressed the distribution of loads among the various walls.
- . SESD Calculation 4.3.2 which addressed the effect of nonsymmetrical constraint by other walls in relation to thermal stresses.
- . Byron/Braidwood Calculation Book 6.1.3 "Primary Shield Wall Final Load Check" which addressed the issue of structural boundary conditions at the Primary Shield Wall - Basemat Interface.
- . Byron/Braidwood Calculation Book 8.99.2, Revision 4, "RPV Shield Wall Design", which addressed the previously identified local over stress condition.

All of the above analyses were reviewed in detail and found to be acceptable. The structural adequacy of the structures covered by these analyses has been demonstrated. The allegation concerning an engineer being fired and others not being promoted in response to safety concerns was dealt with in inspection report 50-454/84-13(DE). Interviews conducted during this inspection indicated no evidence of technical concerns among engineers identified by the alleger. The allegation

concerning the "books" being manipulated to "look good" was also investigated. No evidence of manipulation was found, but in light of the additional confirmatory analysis done by S&L this point becomes moot. Also the inspection report 50-454/84-13 deals with the additional allegation concerning hangers. Report 84-13 and this report covers all issues in the allegation. Therefore the allegation could not be substantiated. This closes the open item (454/84-25-01; 455/84-18-01; 456/84-11-01; 457/84-11-01) concerning this allegation.

3. Allegation Concerning The Use Of 1/4" Concrete Expansion Anchors

a. Allegation

In the same body of allegations mentioned in Paragraph 2 above, the following allegation was also made:

The alleged stated that 1/4" expansion anchor bolts holding electrical, HVAC, instrumentation, and mechanical panels to floors and walls were underdesigned by 30-50%. The alleged further advised this problem was identified three years ago at Zimmer and Marble Hill. Allegedly, S&L demoted the engineers after they had identified the problem. The alleged stated this problem was also applicable to Byron, Braidwood, LaSalle and Clinton.

b. NRC Findings

On May 22-23, 1984, various calculations concerning the use of 1/4" concrete expansion anchors (CEAs) were reviewed. These calculations were not sufficient to allow a conclusion to be drawn relative to the use of 1/4" CEAs. Therefore this became an unresolved item.

On September 4, 1984, further calculations and drawings were reviewed concerning the use of 1/4" CEAs. Sargent and Lundy Calculation 7.16/17.5 "4' and 8' Local Instrument Panels" (anchored using 1/4" CEAs), output from Sargent & Lundy's Anchor Assembly Analysis Program (CINCH), and drawing M-33, Revision L, sheet 38 were reviewed and found acceptable. These calculations cover the following Local Instrument Panels:

2PL50J	2PL78JA
2PL52J	2PL78JB
2PL55J	2PL79JB
2PL70J	2PL81JA
2PL74J	2PL81JB
2PL75J	2PL82JA
2PL66J	2PL82JA
2PL67J	2PL82JB
2PL56J	2PL84JA
2PL57J	2PL84JB
2PL72J	OPL50J
2PL77JC	OPL53J
2PL85JA	OPL53JA
2PL85JB	OPL53JB
2PL69J	

The calculations reviewed were acceptable and showed no evidence of underdesign. This review of S&L design method concluded that S&L methodology for the design of 1/4" CEA is correct. This methodology is essentially the same for all other plants (Zimmer, Marble Hill, Braidwood, LaSalle and Clinton). No evidence of technical concerns or adverse personnel actions were indicated in interviews with engineers (who the allegor stated were knowledgible area) as detailed in report 50-454/84-13(DE). Therefore this allegation could not be substantiated. This closes the unresolved item 454/84-25-02; 455/84-18-02; 456/84-11-02; 457/84-11-02) concerning 1/4" CEAs.

4. Exit Interview

The inspector met with representatives (denoted in Paragraph 1) at the conclusion of the inspections. The inspector summarized the scope and findings of the inspections noted in this report.