U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Reports No. 50-454/84-25(DRS), 50-455/84-18(DRS);
50-456/84-11(DRS), 50-457/84-11(DRS)

Docket Nos. 50-454, 50-455;
50-456, 50-457

Licenses No. CPPR-130, CPPR-131;
CPPR-132, CPPR-133

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

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

Inspection At: Sargent & Lundy Engineers, Chicago, IL

Inspection Conducted: April 25, May 22-23 and June 19, 1984

Inspectors: D H Danielson for J. W. Muffett — 7/18/84 Date

D H Danielson for P. D. Kaufman — 7/18/84 Date

D H Danielson for J. F. Norton — 7/18/84 Date

Approved By: D H Danielson
D. H. Danielson, Chief
Materials and Processes Section — 7/18/84 Date

Inspection Summary

Inspection on April 25, May 22-23 and June 19, 1984 (Reports No. 50-454/84-25(DRS), 50-455/84-18(DRS); 50-456/84-11(DRS), 50-457/84-11(DRS))
Areas Inspected: Announced special safety inspection to review design calculations and analyses concerning the primary shield wall, reactor pressure vessel shield wall, and ¼" concrete expansion anchors in response to an allegation. The inspection involved a total of 72 inspector-hours onsite by three NRC inspectors and eight inspector-hours in the Region III office by one NRC inspector.
Results: No items of noncompliance or deviations were identified.

DETAILS

1. Persons Contacted

Commonwealth Edison Company (CECo)

K. A. Ainger, Project Engineering
*D. Farrar, Nuclear Licensing
D. Swartz, Nuclear Licensing
*T. Tramm, Nuclear Licensing
*J. T. Westermeier, Project Engineering

Sargent and Lundy

*A. Morcos, Assistant Head, S&L QA Division
*K. Kostal, Assistant Manager, Structural Department
*R. McCluer, Structural Project Engineer
*D. C. Patel, Supervising Design Engineer
*R. W. Hooks, Assistant Division Head - Structural Engineering Division
*B. A. Erler, structural Design Director
R. Rabin, Senior QA Coordinator
A. Al-Dabbagh, Senior Engineering Analyst
J. Pop, Jr., Senior Engineering Analyst
J. N. Diebold, Senior Structural Engineer
V. Voigt, Senior Structural Engineer
J. P. Matz, Senior Structural Engineer
T. G. Best, Senior Structural Engineer
T. J. Ryan, Structural Project Engineer
H. S. Taylor, Head, QA Division
T. G. Longlais, Head, Structural Engineering Division
A. K. Singh, Assistant Division Head, Structural Analytical Division

*Denotes those attending the exit interview.

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

On May 27, 1983 and February 14, 1984 anonymous allegations concerning Sargent & Lundy design practices were received by the NRC. One portion of the allegation is summarized below. The remaining allegations will be included in separate inspection reports.

> The Byron plant was unsafe because of foundation problems. The sacrificial shield foundation was weak by a factor of 50%. The alleger claimed the foundation would move, slide or crack in an earthquake of 4.5 on the Richter scale causing radiation to leak from containment. The alleger 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 alleger stated that data for the sacrificial shield to foundation connection was

manipulated to make the books look good. The alleger contended that the quantity of rebar in the sacrificial shield and foundation had been significantly reduced. According to the alleger 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 alleger claimed to have in his possession, the original records of the manipulated data.

In response to this allegation inspections were held at S&L on April 25, 1984 and May 23, 1984. The purpose of these inspections was to review existing design calculations for the Reactor Pressure Vessel Shield Wall (SAD calc. 8.99.2) and Primary Shield Wall (Byron/Braidwood calc. book 6.1.1).

After review of these calculations four significant technical issues were discovered. These are:

a. 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 aportion seismic loads among the various walls. No analysis is provided to justify this assumption.

b. 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.

c. 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)

d. In the Reactor Pressure 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 on May 23, 1984. At the close of this discussion an agreement was reached to address these issues. The licensee committed to perform the following additional work:

. Complete work on the primary shield wall final load check model that includes a portion of the fill slab around the primary shield wall.

. Account for the non-axisymmetric restraint of the primary shield wall for thermal loading.

. Perform further analysis to verify the methods used to distribute seismic loads to the primary shield wall.

. Clarify the reactor shield wall calculations to show there is no overstressed condition for design basis loadings.

This additional work is due to be completed on approximately June 20, 1984.

Although this allegation appears to be partially substantiated due to the nature of the discrepancies discovered, it is not possible prior to the completion of the additional analyses to make a definitive statement about the validity of these allegations. Therefore this will remain an open item pending NRC review of the additional analysis (Open Item 454/84-25-01; 455/84-18-01; 456/84-11-01; 457/84-11-01).

3. Allegation (Concerning the Use of ¼" Concrete Expansion Anchors)

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

> The alleger stated that ¼" expansion anchor bolts holding electrical, HVAC, instrumentation, and mechanical panels to floors and walls were underdesigned by 30-50%. The alleger 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 alleger stated this problem was also applicable to Byron, Braidwood, LaSalle and Clinton.

Calculations concerning the use of ¼" concrete expansion anchors were reviewed during this inspection. This item requires more information to determine the acceptability of these ¼" concrete expansion anchors and therefore is an unresolved item. (Unresolved Item 454/84-25-02; 455/84-18-02; 456/84-11-02; 457/84-11-02).

4. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. An open item disclosed during the inspection is discussed in Paragraph 2.

5. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. An unresolved item disclosed during the inspection is discussed in Paragraph 3.

6. Exit Meeting

The inspectors met with the personnel denoted in Paragraph 1 of this report on May 28, 1984 to discuss the scope and findings of this inspection. At this meeting commitments were made to perform tasks covered in Paragraphs 2 and 3 of this report.