

SARGENT & LUNDY  
ENGINEERS  
CHICAGO

Project No. 4391/4392-02  
4683/4684-02

Commonwealth Edison Company  
Byron/Braidwood - Units 1 & 2

Notes of Meeting Held at  
Sargent & Lundy Offices on  
October 20 through 23, 1981

THOSE PRESENT:

N. C. Chokshi )  
R. E. Lipinski ) Nuclear Regulatory Commission (NRC)

W. F. Segersell ) Commonwealth Edison Company

\*A. K. Singh )  
\*F. Y. Aghakhan )  
\*M. Amin )  
\*A. Dermenjian )  
\*J. H. Gray )  
\*C. N. Krishnaswamy )  
\*T. G. Longlais )  
\*R. R. McCluer ) Sargent & Lundy  
\*N. K. Mehta )  
R. J. Netzel )  
D. C. Patel )  
\*J. K. Patel )  
\*S. Putman )  
\*G. Smolak )  
\*V. Singla )  
\*V. V. Voight )  
O. Zaben )

\*Part-time

1. Purpose

The NRC Structural Engineering Branch performed a Structural design audit of the Byron/Braidwood project. The purpose of this structural design audit was the following:

- a. To investigate in detail the manner in which the applicant has implemented the structural design criteria committed to in the Safety Analysis Report.

November 2, 1981

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- b. To verify that key structural design calculations are acceptable.
- c. To identify and assess the safety significance of areas that were designed using methods other than those given by the NRC Standard Review Plans and Regulatory Guides.

This audit is considered as an integral part of the licensing review process and constitutes the basis for the NRC staff's preparation of the Safety Evaluation Report.

## 2. Conduct of Audit

The attached agenda identifies the Category I structures reviewed during the audit. In addition, the results of the Seismic Reassessment Program for Category I structures and components were presented to the NRC.

Detailed audit checklists, provided by NRC prior to the audit, were completed by Sargent & Lundy and used throughout the audit. The audit of each safety related structure began by Sargent & Lundy presenting an overview of the structure including basic description, analysis/design assumptions, modeling techniques and any unique features. The audit sheets were then used to follow through the specific analysis/design process including the review of key results. The NRC auditing personnel randomly interjected with questions and requests to review the actual design calculations. If resolution required additional engineering data to be provided, the specific action item was identified and recorded in the meeting minutes.

## 3. Action Items

The attached list of action items was developed during the audit. This list also summarizes items closed during the audit and identifies the responsibility for the follow-up action items. Also, attached is a list of documents submitted to the NRC as a result of their requests for additional information during the audit. These documents include the design audit forms, Sargent & Lundy calculations and reports, and technical papers.

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4. Conclusion

The audit proved to be an effective way of performing a licensing review. The scheduled date for submittal of the Safety Evaluation Report (SER) to the Advisory Acommittee on Reactor Safety is February, 1982. Mr. R. Lipinski of NRC stated that if our response to action items is received by December 1, 1981, there stands a good chance of closing these items so that they will not appear as open in the SER.

R. J. Netzel

RJN:kv

Copies:

J. Westermeier	(2)
A. W. Klienrath	(1)
R. Cosaro	(1)
G. Sorensen	(1)
M. A. Stanish	(1)
T. R. Sommerfield	(1)
R. E. Querio	(1)
J. F. Gudac	(1)
C. W. Fruehe	(1)
J. M. Lavin	(1)
V. I. Schlosser	(1)
G. P. Wagner	(1)
J. D. Deress	(1)
LEA	(1)
WAC	(1)
RNB	(1)
WGH	(5)
DCM	(6)
JMM	(5)
DLL	(1)
WCC	(1)

AGENDA OF NRC AUDIT  
OF BYRON/BRAIDWOOD PLANTS

<u>DATE</u>	<u>SUBJECT</u>	<u>SPEAKERS/TIME/PLACE</u>
Tues. 10/20 8:30 a.m.	1) Introduction Purpose End Products	NRC 8:30 - 9:00/28E33  Procedures
	2) Overview of Plant Design a. General Arrangement b. Seismic Analysis c. Seismic Reevaluation	10:00 - 12:00/28E33 R. J. Netzel A. K. Singh R. J. Netzel
	3) Containment a. Audit of Design b. Ultimate Capacity c. Interior Structures d. Action Items	1:00 - 5:00/28E33 S. Putman C. Krishnaswamy D. C. Patel/V. K. Singla NRC
Wed. 10/21 8:30 a.m.	1) Auxiliary Bldg. 2) Essential Service Cooling Towers 3) Action Items	8:30 - 5:00/28E33 G. Smolak V. Voight NRC
Thurs. 10/22 8:30 a.m.	1) Seismic Category 1 Tanks and Underground Structures 2) Crane Supports 3) River Screen House (Byron) 4) Action Items	8:30 - 5:00/29018 F. Aghakhan A. Dermejian F. Aghakhan J. K. Patel NRC
Friday 10/23 8:30 a.m.	1) Review of Responses to NRC Questions 2) Schedule 3) Adjournment	NRC/S&L 9:00 - 1:00/29018

INFORMATION SUBMITTED TO THE NRC  
FOR THE DESIGN ADEQUACY AUDIT OF  
OCTOBER 20 THROUGH OCTOBER 23, 1981

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9. CONTAINMENT STABILITY	1-6
10. CONTAINMENT LINER REPORT - J. M. DOYLE & S. L. CHU	1-7
11. CRITERIA COMPARISON OF ASME SUBSECTION NE WITH SRP 3.8.2	1-3
12. CONTAINMENT SKETCHES THROUGH NSSS ENCLOSURES	1-4
13. ACCIDENTAL EXPLOSION REPORT - S. T. WU, W. T. LI & B. P. JAIN	1-45
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15. AUXILIARY BUILDING MAT STABILITY CALCULATIONS	1-15
16. SHEAR WALL DESIGN PROCEDURE	1-14
17. MASONRY WALLS ASPECT RATIO	1-4
18. MISSILE RESISTANT CONCRETE PANELS	1-38
19. AUXILIARY BUILDING SHEAR WALL COMPARISON OF REINFORCING STEEL WALL L, Q, 30	1-1
20. ESSENTIAL SERVICE COOLING TOWER CALCULATIONS	1-14
21. ANALYSIS OF BURIED ESSENTIAL SERVICE WATER PIPING	1-32
22. SARGENT & LUNDY REPORT 3026	1-28
23. SEISMIC ANALYSIS OF CRANE BRIDGE GIRDERS & THE CABLE	1-12

STRUCTURAL DESIGN AUDIT  
BY  
NRC STRUCTURAL ENGINEERING BRANCH  
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LIST OF ACTION ITEMS

1. Inclusion of additional 5% accidental torsion into the seismic analysis models for the project.  
  
Action: S&L to assess the impact and provide response to NRC by November 16, 1981.
2. Response to Question No. 130.19 (Decoupling Criteria).  
  
Action: S&L discussed the preliminary response with NRC and formal response will be submitted to NRC by November 16, 1981.
3. Revision to response for Question No. 130.20 (Lumped mass criteria).  
  
Action: Revision to response was agreed upon between S&L and NRC. Formal response will be sent to NRC by November 16, 1981.
4. Additional information in response to Question 130.06 (Seismic reassessment).  
  
Action:
  - A. S&L to provide actual stress interaction in reinforced concrete design prior to and after the refinements used, for the containment shell and basemat during the reassessment by November 16, 1981.
  - B. S&L provided sample calculations for cable tray and HVAC supports where ductility ratio exceeded one. (Item closed)
  - C. S&L to respond to NRC with the justification for the methodology used for cable tray supports (OBE & SSE enveloped spectra used with SSE allowable stress levels) by November 16, 1981.
5. Modifications to Byron River Screen House.  
  
Action: S&L to provide NRC with the extent of modifications required as a result of response to Question 130.09 by December 1, 1981.

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LIST OF ACTION ITEMS  
(cont'd.)

6. NRC Question No. 130.35 (Transient Loads).

Action: Response to this question is acceptable to NRC. However, S&L will address assymmetric pressure loads on the containment and internal structures when responding to Question Nos. 110.14 and 110.62. S&L to respond to these questions by December 1, 1981.

7. NRC Question No. 130.38 (In-Service Tendon Surveillance).

Action: S&L to provide justification for the deviation from Regulatory Guide 1.35.

8. Effect of "jerking" the cable in the Crane Analysis.

Action: S&L provided a study performed for the Zimmer project. However, S&L to provide summary (as discussed with NRC) concluding that jerking of cable has no impact on Byron/Braidwood project.

9. Containment Stability.

Action: S&L provided calculations. (Item closed)

10. Containment Liner Analysis and Design.

Action: S&L provided liner analysis and design report by J. M. Doyle and S. L. Chu. (Item closed)

11. NRC Question No. 130.52 (Containment Ultimate Capacity).

Action: NRC to inform S&L of the requirements to answer the question, if any. NRC is also to confirm that containment ultimate capacity should not be a SER issue.

12. NRC Question No. 130.21 (Deviations from ACI 349).

Action: S&L to provide response by November 16, 1981.

13. Tangential Shear for the Containment.

Action: S&L to provide impact of ASME Code Case N250 by November 16, 1981.



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LIST OF ACTION ITEMS  
(cont'd.)

14. NRC Question No. 130.41 (Conformance to SRP 3.8.2 on Load Combinations).

Action: S&L provided comparison of criteria between ASME Subsection NE and SRP. (Item closed)

15. NRC Question No. 130.42 (Description of Internal Structures).

Action: S&L provided additional sketches of the steam generator enclosure wells. (Item closed)

16. NRC Question No. 130.28.

Action: S&L provided Report SL-3028. (Item closed)

17. Blast Pressure.

Action: S&L provided SAD Report No. 178. (Item closed)

18. Compliance to Regulatory Guide 1.61.

Action: S&L provided stress levels for representative shear walls. (Item closed)

19. Two inches thick premolded filler joint between Containment and Auxiliary Building.

Action: S&L to provide physical properties of Ethafoam by November 16, 1981.

20. Auxiliary Building Stability.

Action: S&L provided calculations for the sliding and overturning. (Item closed)

21. NRC Question No. 130.49 (Category I E.S.C.W. piping in the Turbine Building Mat).

Action: S&L to provide NRC with the revised response (Revisions discussed and agreed by NRC) by November 16, 1981. Revised response to include the statement that contract quality control records are available at t .

22. Shear Wall Design

Action: S&L provided design procedure and example calculations. (Item closed)



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LIST OF ACTION ITEMS  
(cont'd.)

23. Masonry Walls

- Action: A. NRC to provide their position in regards to their concerns for unreinforced masonry walls.
- B. S&L to provide a list of interior walls not yet constructed at Byron and Braidwood.
- C. S&L provided the aspect ratios for the masonry walls. (Item closed)

24. NRC Question No. 130.25 (Barrier Designs for Missiles).

- Action: S&L provided reference paper and calculations. (Item closed)

25. NRC Question No. 130.31 (Shear Walls).

- Action: S&L provided table of actual steel required versus steel provided for the shear walls listed in the question. (Item closed)

26. NRC Question No. 130.43 (Description of Category I Structures).

- Action: S&L to provide sketches for River Screen House, Essential Service Cooling Tower, Lake Screen House, Deep Well Enclosure, Safety Valve Room and the additional two sections for the Auxiliary Building. S&L will provide these sketches by November 16, 1981.

27. NRC Question No. 130.53 (Spent Fuel Pool Racks).

- Action: S&L to provide response by November 16, 1981.

28. Essential Service Cooling Tower.

- Action: S&L provided calculations for sliding of foundation and for the concrete column in the exterior wall. (Item closed)

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LIST OF ACTION ITEMS  
(cont'd.)

29. Buried Piping

Action: S&L provided design procedure and the calculations.  
(Item closed)

30. Missile Protection for Manhole Cover.

Action: S&L to provide information for the manhole cover justifying its compliance to missile protection. S&L will provide the information by November 16, 1981.

STRUCTURAL DESIGN AUDIT  
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SUMMARY OF ACTION ITEMS

<u>Action Item Number</u>	<u>Responsible Engineer</u>	<u>Scheduled Completion Date</u>
4B, 09, 10, 14, 15, 16, 17, 18, 20, 22, 23C, 24, 25, 28, 29		Completed October 23, 1981
01, 02, 03 04A, 07, 08, 13	S. Putman	November 16, 1981
04C, 12, 19, 21, 23B, 26, 30	D. C. Patel	November 16, 1981
05, 06	S. Putman & D. C. Patel	December 1, 1981
27	G. Kao	November 16, 1981
11, 23A	NRC	As soon as possible.