

COMMONWEALTH EDISON COMPANY
LA SALLE COUNTY STATION
CHICAGO, ILLINOIS

INDEPENDENT HVAC REVIEW
INTERIM REPORT
PROJECT 6356-N

C F BRAUN & CO
ALHAMBRA, CALIFORNIA
SEPTEMBER 15, 1982

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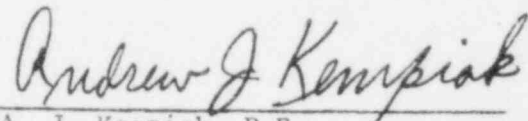
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La Salle

INTERIM REPORT

This interim report contains the preliminary results of the Independent HVAC Review of the Commonwealth Edison La Salle Station Unit 1 Nuclear Power Plant as performed by C F Braun.

As C F Braun Project Manager for this review, I state that C F Braun has maintained independence, has not been coerced by any of the parties involved and has had complete cooperation from all parties in the performance of this review.



A. J. Kempniak, P.E.
Project Manager

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1.0 INTRODUCTION

At the request of the Nuclear Regulatory Commission (NRC), Commonwealth Edison Company (CECO) obtained the services of an outside engineering-construction firm, CF Braun, to conduct an independent review of the seismic, safety related and seismic supported, non safety related heating, ventilating and air conditioning (HVAC) systems installed in Unit I of CECO's La Salle County Station in La Salle County, Illinois.

On August 11, 1982 in a public meeting at the NRC region III offices, Braun presented their qualifications and experience in the design of HVAC systems for nuclear, industrial and commercial installations.

The work plan including, quality control and quality assurance requirements, was presented to the NRC on August 24, 1982 at the NRC region III offices.

On August 23, 1982 Braun sent the review team project manager, QA engineer, QC supervisor, and HVAC technical advisor to La Salle County Station to formulate the procedures and begin project operations.

This interim report presents the progress and status of this independent HVAC review. It includes the following items.

- Scope
- Work Plan
- Summary
- Status
- Outlook/Projections

The attachments provide the following information.

- Appendix A - List of documents received from CECO/S&L/Zack
- Appendix B - QC Procedures
- Appendix C - QA/QC Qualification
- Appendix D - Observation/Finding Reports
- Appendix E - Personnel Experience Summaries

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2.0 SCOPE OF WORK

The scope of work for this project is to perform an independent review of the safety-related, and seismic supported non-safety related HVAC systems at the Commonwealth Edison Company (CECo) La Salle County Nuclear Plant. The S&L design is not in question and will not be reviewed.

The review will include all seven La Salle unit one safety-related HVAC systems listed below.

- 1 - Control Room HVAC System (System Identification Code VC)
- 2 - Auxiliary Electric Equipment Room HVAC System (VE)
- 3 - Diesel-Generator Room Ventilation System (VD)
- 4 - CSCS Equipment Area Cooling System (VY)
- 5 - Switch Gear Rooms Ventilation Systems (VX), except for the recirculation duct in the Auxiliary Building HVAC Equipment Room.
- 6 - Portions of the Reactor Building Ventilation System (VR) - The following parts of the reactor building ventilation system are safety-related.
 - Supply air duct between and including the secondary containment isolation dampers and the duct penetration of the secondary containment boundary.
 - Exhaust air duct between and including secondary containment isolation dampers, and the duct penetration of the secondary containment boundary.
- 7 - Those portions of the Standby Gas Treatment System SGTS (VG) installed by the Zack Co.

The review will also include the supports for all three non-safety related but seismically supported systems listed below:

- 8 - Primary Containment Ventilation System (VP)
- 9 - Primary Containment Purge System (VQ)
- 10 - Reactor Building Ventilating System (VR)

The primary objective of this independent review is to provide verification that the HVAC installation by the Zack Co. is in accordance with the Sargent and Lundy design. This will include, but not be limited to, a review of -

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Sept 11 1975

SCOPE OF WORK Continued

Material installed

Field and shop welding on supports and ductwork

Operability of associated mechanical equipment

Design changes as a result of site nonconformances

Field testing by Zack Co. up to, and including, any construction testing performed by Zack Co. or their subcontractors.

If required, Braun will identify any additional testing or changes necessary to assure that the HVAC systems fulfill their safety function. Braun will also review the adequacy and results of these additional tests performed by others.

All observations made during the review will be documented and submitted to a Braun site and internal review team composed of senior technical personnel with broad experience in technical management. These review teams will determine if the observation is accurate and has the potential for a safety concern.

All inspection, review activities, quality assurance and project procedures to be performed by C F Braun & Co during this independent review of the HVAC systems will be conducted in accordance with written project and QA instructions.

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3.0 WORK PLAN

This section of the report describes the work plan for Braun's independent review of the HVAC installation.

The HVAC technical advisor will compare the S&L design documents to the Zack Co. shop drawings to verify that Zack has correctly interpreted the design documents. Zack's procedures for procurement and processing of HVAC material will be reviewed by the QA and welding/material engineers to evaluate their conformance to appropriate S&L design documents and ANSI standards, this will include verification that the materials installed are of comparable quality.

The welding/material engineer will also review the weld procedure qualifications and welder qualifications associated with the ductwork fabrication practices. Any information or testing generated by CECO or Conam will be used to assist in this evaluation. Zack's fabrication procedures will be compared to SMACNA standards and ANSI 509 requirements, as appropriate, in addition to that required by the design documents.

The HVAC technical advisor will survey all the installed duct systems as defined in section 2.0. INTRODUCTION. Based on this survey he will select portions of the system whose failure may jeopardize the operation of safety-related equipment for detailed inspection. The portions selected will include concealed and insulated ductwork. If discrepancies are found in the selected portions, then additional portions of ductwork will be selected for further inspection. Braun is prepared to inspect 100 percent of the system if deemed necessary.

The leak rate and balancing test for the Control Room HVAC System (VC), CSCS Equipment Area Cooling System (VY) and portions of the Reactor Building Ventilation System (VR) will be reviewed in detail to verify system conformance to the design documents. Spot checks will be made of the Auxiliary Electric Equipment Room HVAC system (VE), Diesel Generator Room Ventilation System (VD) and Switch Gear Rooms Ventilation Systems (VX) to ascertain that they have been tested to the same quality as that of the systems reviewed in detail. In addition, the HVAC technical advisor will survey the system operating tests performed by CECO to verify that the results confirm the adequacy of the balancing/leak rate tests.

The Structural Technical Advisor will categorize and review the nonconformance reports generated against the HVAC support systems. Structural discrepancies discovered as a result of inspection activities will be evaluated to determine whether the existing support satisfies the intent of the design. The Structural Technical Advisor will also review any specification or other contract documents which address the structural integrity of the HVAC systems.

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WORK PLAN Continued

A review of the HVAC refrigerant system, subcontracted by Zack, will also be accomplished. Preliminary information indicates that there have been no nonconformances generated against these systems.

In addition to this step-by-step review of the Zack installation, Braun will review all CECO and Zack NCRs and FCRs generated against the installed system. Each document will be categorized by type for example, weld problem; material certification lacking; location/dimensional/interference discrepancy; fabrication problem; etc. The frequency of occurrence and importance of each category will be assessed. Twenty percent of those types determined to be critical to safety will be inspected in detail to verify that the specified disposition has been correctly implemented. If discrepancies are found, then the remaining NCRs of this type will be reviewed.

The HVAC technical advisor will randomly select other parts of the system to be inspected for similar types of nonconformances. The inspections will result in a determination of whether or not similar types of nonconformances may have existed on these random sections but were not reported.

During Braun's review of the HVAC support nonconformance reports (NCR) they will evaluate 10 percent of the NCR's to determine if the technical justification is correct. If Braun's review determines safety concerns involving significant as-built design changes, then these changes will be evaluated against the design documents.

QA/QC procedures are described in the Project and QA Instructions which were transmitted to CECO via BL-5, dated September 10, 1982. Appendix B, QC Procedures has been included in this interim report for information purposes.

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4.0 SUMMARY

The project has been fully staffed in the field with 5 inspectors, 4 technical advisors, QA engineer and project manager. The welding and material engineer has been reviewing documents in Alhambra and visiting the site as needed. An internal review committee of 3 specialists has been formed in Alhambra to perform a review of those inspection discrepancies which the site committee feels are potential safety concerns.

Project and QA instructions were issued as controlled documents which provide the written procedures to accomplish the review.

A member of CECO's operating QA group conducted an audit of Braun activities on Friday September 10, 1982. Although the audit report has not been received, the auditor indicated that there were no negative findings.

On Monday September 13, 1982 an inspector from the Nuclear Regulatory Commissions Region III's office visited the C F Brauns site office facilities. He was given an uncontrolled copy of the C F Braun project and quality assurance procedures. During the visit he reviewed several inspection reports (QC-1) and one observation/finding report (QC-2). He talked to the HVAC advisors and reviewed the field inspection activities.

We have performed a field survey for 5 of the 10 HVAC systems requiring review. This has led to the generation of 134 requests for inspections of selected hangers and ductwork sections. Some of the reasons for selecting the hanger and duct sections chosen are its location relative to other safety equipment, similarity to other hangers or duct sections, relative importance compared to other portions of system and type of equipment installed in system such as damper, silencers, cooling coils, etc.

Weld procedure specifications and welder performance qualification tests have been reviewed by our material and welding specialists. We need to resolve questions on the former item while the latter item appears acceptable pending a more detailed review.

There are approximately 2400 NCRs written against the Zack installation. Close to 1800 have been written against supports with the remainder covering dampers, fans and other HVAC components. Braun has received and reviewed too small a quantity of these NCR to formulate any opinions or provide for any categorization. We are continuing our review efforts as the reports are received.

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See to memo 15. 1980

SUMMARY Continued

Inspection has completed or partially completed, 54 of the 134 requested inspection reports QC-1. This has led to the issuance of 12 observation/finding reports. The site review team has determined that 8 of these discrepancies are technically acceptable and 3 are observations requiring CECO disposition with one being held for further review.

Inspection activities have been hampered by accessibility requirements for security concerns, removal of insulation and fireproofing, erection of scaffolding and difficulty of getting close to items needing inspection due to existing cable trays, conduits, piping, equipment etc.

Insulation had to be removed from 72 hangers and fireproofing from 55 hangers at the point of connection to the building structure. Fifty one hangers required the installation of scaffolding to provide the required access. This encompasses the ongoing inspection activities.

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5.0 STATUS

The Project and QA Instruction have been written, reviewed and approved for use as a controlled document on this project by the Project Manager and the QA Manager in Alhambra, California. These instructions define the procedures to be followed by all C F Braun personnel in the performance of this review.

The HVAC technical advisor and engineer have reviewed the ductwork drawings and performed field surveys for 5 of the 10 HVAC systems. Based on this effort they have generated 134 requests for inspections (RFI) of selected hangers and ductwork sections within these systems. A list of systems, percent complete and number of RFIs follows.

<u>SYSTEM</u>	<u>PERCENT COMPLETE</u>	<u>RFI</u>
Control Room HVAC, VC	60	60(1)
Auxiliary Electric Equipment Room HVAC, VE	80	12
Diesel-Generator Room Ventilation, VD	100	11
CSCS Equipment Area Cooling, VY	80	(2)
Switchgear Room Ventilation, VX	100	51
	TOTAL	134

- (1) Includes VE system since VE & VC are on same support
(2) Included with/VD

The only work remaining for system VE is that portion of ductwork located in Unit 2 which acts as a backup for the Unit 1 VE system.

The welding and material specialist has reviewed 6 welding procedure specifications. Comments have been noted on several of these specifications which require further review and discussions with the contractor. In addition he has performed a preliminary review of 91 welder performance qualification test record packages. The majority appear to be acceptable but a more detailed review is required.

The structural technical advisor has reviewed the 20 available non-conformances and found them acceptable. He has developed inspection criteria for surface mounted anchor plates. Sargent and Lundy Report CQD-003490, Revision 0 Assessment of Stitch Welds in HVAC Ductwork Construction has been reviewed. The results were found reasonable due to the small loads imposed on individual welds. He has evaluated the initial group of discrepancies noted on the observation/finding reports.

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12, 1975

STATUS Continued

A status of inspection activities follows:

INSPECTIONS REQUESTS, QC-1

Received from HVAC		134
Inspected		
Complete	47	
Partial (1)	<u>7</u>	<u>54</u>
Backlog (2)		80

- (1) Fireproofing needs to be removed at attachment of steel member to wall plate otherwise support has been inspected.
- (2) Some of the items causing the inspection backlog are as follows:
 - 1 - Insulation needs removal
 - 2 - Removal of fireproofing
 - 3 - Scaffolding needs to be set up - some ducts are 40' above floor level.

OBSERVATIONS/FINDINGS, QC-2

Found acceptable		8
Held for material engineer review		1
Observation		3
Finding		<u>0</u>
	TOTAL	<u><u>12</u></u>

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See page 15, 19, 20

6.0 OUTLOOK

A management audit of project activities will be accomplished during the week of September 20, 1982 by the Manager of Quality Assurance, Alhambra.

Audits of engineering and inspection activities have been scheduled and will be conducted by the project quality assurance engineer during the three weeks commencing September 20, 1982.

The HVAC technical advisor will complete the 3 systems identified in section 3.0 STATUS as well as the reactor building ventilation-VR, SGTS-VG and the 3 non safety related but seismically supported system. He needs to correlate the design and construction drawings as well as review NCR/FCR, balance/leakage tests, system operating tests and refrigeration tests.

The material and welding specialist will discuss his comments on the welding procedure specifications with the contractor and complete his review of the welder performance qualifications tests. He will also assist in the evaluation of whether or not the installed material is of comparable quality to that required by the design documents.

The structural technical advisor will continue reviewing the nonconformances and participate in the site committee's review of observation/finding reports.

Inspections will continue for the HVAC system survey requests and other inspection requests as a result of NCR reviews.

Outlook for completion of this independent review is mid October.

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APPENDIX A

LIST OF DOCUMENTS
RECEIVED FROM ZACK,
S&L AND CECO

3 pages

Commonwealth Edison Company, 6356-N, September 15, 1982

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LIST OF DOCUMENTS RECEIVED FROM ZACK, S&L, AND CECO

1.0 ZACK

The following nonconformance reports were received from Zack on September 9, 1982.

NCR # 460	535	612	632	1845(619)
504	571	614	912	1493
510	603	620	1421	1864
534	611	630	1423	

The following nonconformance reports were received from Zack on September 14, 1982.

NCR # 604	616	660	1141	1661	1946	2299
606	631	661	1243	1668	1968	
607	633	662	1251	1669	1973	
608	656	663	1444	1671	2078	
609	657	974	1487	1820	2089	
613	658	977	1532	1823	2243	
615	659	978	1559	1874	2255	

The following purchase orders for Hilti Kwik bolts were received on September 8, 1982:

- P.O. # C2232 dated July 12, 1982
- P.O. # C4036 dated November 30, 1979

Miscellaneous welding procedures, procedure qualifications and welder qualifications were received on August 26, 1982.

SARGENT & LUNDY

The following documents were received from Sargent & Lundy on August 16, 1982:

- 1 La Salle County Station FSAR, Vols. 5 and 7
- 2 June 3, 1976 meeting notes
- 3 MSS-16.1
- 4 MSS-16.2-A
- 5 MSS-7.2
- 6 MF-270.10.1
- 7 RMC-P-1

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LIST OF DOCUMENTS RECEIVED FROM ZACK, S&L, AND CECO (CONTINUED)

- 8 RMC-P-2
- 9 RMC-P-3
- 10 RMC-P-4
- 11 RMC-P-5
- 12 Testing & balancing procedures

The following documents were received from Sargent & Lundy on August 17, 1982:

Air Flow Measuring Station List - Supplement to Sargent & Lundy Specification J-2590

Grille List - Supplement to Sargent & Lundy Specification J-2590

Damper List - Supplement to Sargent & Lundy Specification J-2582

The following documents were received from Sargent & Lundy on September 7, 1982:

Full sized drawings as listed by S&L letter number 4200-25.

The following document was received from Sargent & Lundy on August 30, 1982:

Sargent & Lundy Report CQD-003490, Revision 0, of August 27, 1982, Assessment of Stitch Welds in HVAC Ductwork Construction.

CECO

The following document was received from Commonwealth Edison Co on August 12, 1982:

The letter from T C Fahner, Attorney General State of Illinois to J G Keppler, Regional Administrator, United States Nuclear Regulatory Commission dated August 12, 1982.

The following document was received from Commonwealth Edison Co on August 24, 1982:

The letter from C W Schroeder, Nuclear Licensing Administrator to T M Novak, Assistant Director, Division of Licensing, U S Nuclear Regulatory Commission dated August 24, 1982.

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LIST OF DOCUMENTS RECEIVED FROM ZACK, S&L, AND CECO (CONTINUED)

The following document was received from Commonwealth Edison Co on August 20, 1982:

The letter from C Reed, Vice President, Commonwealth Edison Co to H R Denton, Director, Office of Nuclear Reactor Regulation, U S Nuclear Regulatory Commission dated August 4, 1982.

The following document was received from Commonwealth Edison Co on September 9, 1982:

The letter from T M Novak, Assistant Director for Licensing, Division of Licensing, U S Nuclear Regulatory Commission to C Reed, Vice President - Nuclear Operations, Commonwealth Edison Co dated September 8, 1982.

The following document was received from Commonwealth Edison Co on August 14, 1982:

The letter from B R Shelton, La Salle County Station Project Engineering Manager, Commonwealth Edison to G R Boddeker, C F Braun & Co Power Division dated August 13, 1982.

The following document was received from Commonwealth Edison Co on August 25, 1982:

Four (4) letters addressed to NRC Relative to the LSCS HVAC Review. The letters were sent by: (1) Ms. J. S. Goodie, Asst. Att. Gen. of Ill. (August 24, 1982); (2) Ms. S. L. Mareello (undated - delivered August 24, 1982); (3) Mr. T. Divine, Govt. Acct. Proj. (August 13, 1982); and (4) Mr. A. T. Howard, August 13, 1982).

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APPENDIX B

QUALITY CONTROL

PROCEDURES

14 pages