Commonwealth Edison
One First National Plaza, Chicago, Illinois
Address Reply to: Post Office Box 767
Chicago, Illinois 60690

December 22, 1982

Mr. Darrell G. Eisenhut, Director
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: LaSalle County Station Units 1 and 2
Additional Information Regarding the
HVAC Independent Review
NRC Docket Nos. 50-373 and 50-374

Reference (a): D. G. Eisenhut letter to Cordell Reed
dated December 3, 1982.

Dear Mr. Eisenhut:

The referenced letter granted Commonwealth Edison Company authorization to proceed above 50 percent power at LaSalle Unit 1. That letter, which was received on December 8, 1982, also stated:

> "We request for the record, that you and your contractor, C. F. Braun, furnish, in writing, within 15 days of receipt of this letter, the information you presented at that meeting that responds to the pertinent matters in the GAP reports. In addition, please address your steps you have taken and will take to complete the corrective actions identified by C. F. Braun's observation Q2-53.
>
> Further, since Unit 2 is well into completion of construction of HVAC systems, we request that you inform the NRC staff of steps you have already taken or plan to take with respect to the types of discrepancies uncovered by the C. F. Braun review of the Unit 1 HVAC systems."

Enclosed for your use please find:

Attachment 1 - Slides presented by C. F. Braun to the NRC on December 1, 1982.

Attachment 2 - C. F. Braun's letter to B. R. Shelton, dated December 13, 1982, providing a summary of certain information provided during the December 1, 1982 meeting.

Attachment 3 - Commonwealth Edison Company's expanded response to the six major issues (A,B,C,D,E, and F) raised by the Government Accountability Project. This response was prepared in conjunction with C. F. Braun.

A001
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Attachment 4 - Discussion of the status of completion of corrective actions for C. F. Braun Observation QC-2-53.

Attachment 5 - Discussion of the status of Quality Assurance review of the completion of corrective actions.

Attachment 6 - Discussion of Unit 2 HVAC.

To the best of my knowledge and belief the statements contained herein and in the attachments are true and correct. In some respects these statements are not based on my personal knowledge but upon information furnished by other Commonwealth Edison and contractor employees. Such information has been reviewed in accordance with Company practice and I believe it to be reliable.

If there are any further questions on this matter, please contact C. W. Schroeder, Nuclear Licensing Administrator for LaSalle County Station.

Enclosed for your use are one (1) signed original and thirty-nine (39) copies of this letter and the attachments.

Very truly yours,

C. Reed

Cordell Reed
Vice President

CWS/lm

Attachments

cc: NRC Resident Inspector - LSCS

5631N

ATTACHMENT 1

INDEPENDENT HVAC REVIEW

SYSTEM SURVEY

INSPECTION

DOCUMENT REVIEW

DESIGN VERSUS FABRICATION DRAWINGS

FABRICATION/INSTALLATION PROCEDURES

MATERIAL

WELDING PROCEDURES

VERIFICATION

- BALANCING TESTS
- OPERATING TESTS
- NCR/FCR REVIEW
- REVIEW COMMITTEE

QC PROCEDURES

- QUALITY CONTROL INSPECTION ACTIVITIES
- QUALITY CONTROL INSPECTION STATUS
- PROCESSING OF OBSERVATION/FINDINGS REPORTS

QA PROCEDURES

- QUALITY ASSURANCE RECORDS FILE AND DOCUMENT CONTROL (ANSI N45.2.9)

- TRAINING AND QUALIFICATIONS OF INSPECTORS (ANSI N45.2.6)

- QUALITY ASSURANCE AUDITS (ANSI N45.2.12)

- QUALIFICATIONS OF QUALITY ASSURANCE PROGRAM AUDITS (ANSI N45.2.23)

METHODOLOGY FOR INSPECTION (PAGE 15, SECTION 5.4)

- REVIEW DESIGN DOCUMENTS
- REVIEW ZACK DOCUMENTS
- FIELD SURVEY OF ENTIRE SYSTEMS
- REPRESENTATIVE !TEMS
- 1NSPECTIONS
- ESTABLISH TREND

SELECTION PROCESS

- SAFETY EQUIPMENT IN AREA
- DUCT SIZE
- SUPPORT CONFIGURATION
- SIMILARITY OF ITEMS
- DISCUSSED IN WORK PLAN
  - 7 SAFETY RELATED HVAC SYSTEMS
  - 3 NON-SAFETY BUT SEISMIC HVAC SYSTEM
- ESTABLISH TREND

DEFINITIONS (APPENDIX B, PAGE B3-1, SECTION 2.0)

QC-1

- DISCREPANCY - A DEPARTURE OF THE ACTUAL INSTALLATION FROM THE SPECIFIED DESIGN REQUIREMENTS AS NOTED BY INSPECTION ACTIVITIES OR ENGINEERING REVIEW

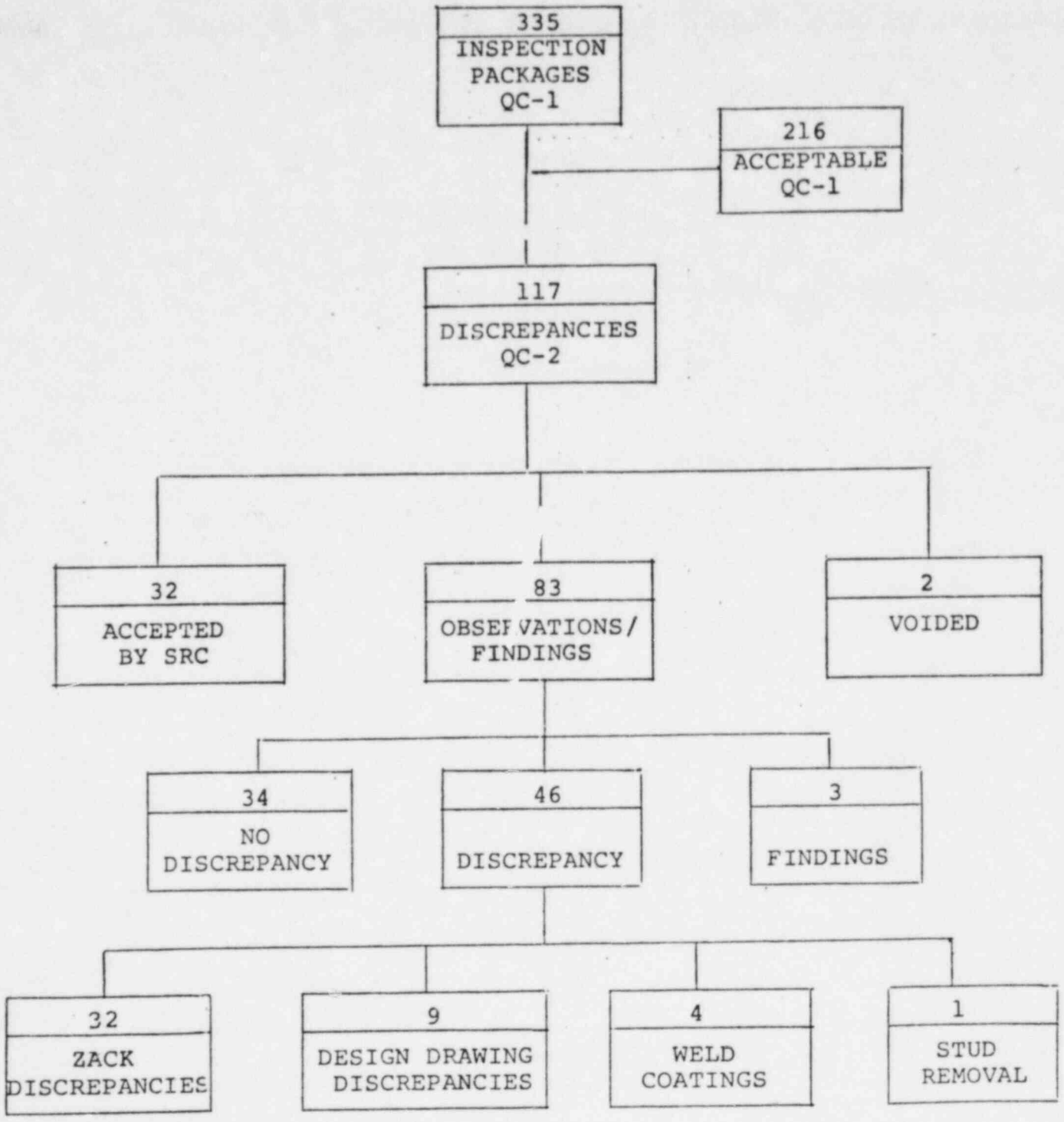
QC-2

- OBSERVATION - A CONFIRMED DISCREPANCY REQUIRING CECO DISPOSITION AND A VERIFICATION OF CORRECTIVE ACTION BY THE SITE REVIEW COMMITTEE.

- FINDING - AN OBSERVATION WHICH HAS BEEN IDENTIFIED AS A POTENTIAL SAFETY CONCERN.

C F BRAUN & CO

FIELD INSPECTION OF HANGER,
DUCT SECTIONS, AND PIECES OF EQUIPMENT



INSPECTION PACKAGES

		SUPPORTS	MAJOR EQUIPMENT	DUCTWORK/DAMPER ASSEMBLIES
TOTAL ITEMS	3,000	1200	100	1700
NUMBER INSPECTED	325	286	23	16

INSPECTION POINTS

325 INSPECTION PACKAGES APPROXIMATELY - 30,000 INSPECTION POINTS

$$\frac{34 \text{ ZACK DISCREPANCIES} \times 100}{30{,}000 \text{ INSPECTION POINTS}} = 0.11\%$$

WELDING
(PAGE 29, SECTION 5.13)

- INDUSTRY STANDARDS
- DESIGN REQUIREMENTS
- GUIDELINES
- WPS AND PQR REVIEW AS BACKUP
- PAPERWORK ONLY
- CONCLUSION BASED ON FIELD INSPECTION
  - 1000'S OF WELDS
  - SUPPORT WELDS ADEQUATE

5.10 NCR REVIEW

During the course of Braun's inspection activities we were able to develop a clear understanding as to the relationship of Zack NCRs, CECo FCRs and CECo NCRs.

Zack NCRs are internal forms utilized by Zack to document discrepancies between the as installed condition and that shown on the design documents. It indicates which items should be repaired to design documents. It indicates which items should be repaired to design requirements as well as those items Zack would like the designer to accept "as is". As such we feel that the nonconformance (NCR) form should have

FIRST

ORIGINAL DRAFT WITH DUPLICATION OF SENTENCE.

For those cases where Zack requested that the designer accept the condition as installed, CECo wrote an FCR (field change request) to identify the change and secure design approval. This was accomplished through the assistance of a S&L site representative thoroughly familiar with the design of HVAC supports. Braun considers this arrangement acceptable and in accordance with industry practice. Final approval still remains with the design agency responsible for the complete design drawings. As previously mentioned, Braun has verified the existence and adequacy of the design approval.

CECo NCRs have been utilized to disposition nonconforming conditions which exist after all construction work has been accepted. An example of their use would be CECo NCR 409. This NCR documents the inadequacies of Zack's early inspection efforts and stipulates the remedial action required - including 100 percent over inspection by Conam.

Based on the above, Braun feels that the large number of Zack NCRs generated against the HVAC installation does not reflect a lack of quality in the fabrication/erection of the HVAC system. Rather, they indicate that Zack has properly documented as built conditions and taken corrective action to rectify nonconforming items.

Braun has retained a copy of the CECo transmittals listing all the NCR's sent to Braun. In addition Braun has checked the NCR's received on a copy of Zack's NCR log. These documents are included in the project files as backup material to this report.

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SECOND

AS PRESENTED IN FINAL REPORT WITH EDITING/TYPOGRAPHICAL MISTAKE.

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THIRD

PARAGRAPH WITH MISSING PORTION OF SENTENCE INCLUDED.

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ATTACHMENT 2

C F BRAUN & CO Engineering and Construction Subsidiary of Santa Fe International Corporation

December 13, 1982

B R Shelton
Commonwealth Edison Co
SNED-35 FNB
P O Box 767
Chicago, IL 60690

BL-27

Dear Mr. Shelton

COMMENTS ON FINAL REPORT
LA SALLE STATION
ADVANCE PURCHASE ORDER 805-023
BRAUN PROJECT 6356-N

We have received the December 3, 1982 letter from the Office of Nuclear Reactor Regulation (NRR) authorizing Commonwealth Edison to proceed above 50 percent power at La Salle County Station Unit 1. Per your direction, attached to this letter is Braun's response to NRR's request that we provide the information presented at the December 1, 1982 Bethesda meeting which responds to the pertinent matters in the GAP Report.

Sincerely yours

Andrew J Kempiak

AJK df

Andrew J Kempiak
Project Manager

Commonwealth Edison Co — Project 6356-N
La Salle — INDEPENDENT HVAC REVIEW RESPONSES TO NRC LETTER — December 13, 1982

METHODOLOGY

Braun's methodology for inspection is presented in detail on page 15, section 5.4 of the report. The basic elements are as follows:

Review design documents
Review Zack documents
Field survey of entire systems
Selection of representative items
Inspections
Establish trend

Braun surveyed the entire 10 systems defined on page 5, section 2.0 of the Report. The inspections included a sufficient sampling of hangers, duct sections and pieces of equipment for Braun to conclude that the installation is in accordance with the design.

The following table provides a listing of packages by major components.

	Supports	Major Equipment	Ductwork/Damper Assemblies
Total items 3000	1200	100	1700
Number inspected 325	286	23	16

The following factors were considered when selecting representative items for detailed inspection:

Safety equipment in area
Support configuration
Similarity of items

DISCREPANCY RATE

The Braun HVAC engineers initiated 335 inspection packages, some of which were voided or superseded. These 335 packages encompass 30,000 individual inspection points. Each inspection point is a potential discrepancy. Braun inspections revealed a total of 117 potential discrepancies. After review by the site review team and the design agency it was determined that 34 discrepancies are attributable to Zack. This results in a discrepancy rate of 0.11 percent, grossly less than the 34 precent rate reported in page 5, section II of the November 30, 1982 GAP letter.

TYPOGRAPHICAL ERROR

Page 23, section 5.10, paragraph 2 of the Final Report included a missing line. GAP's November 19, 1982 letter page 7, section 5 alleges that the "paragraph has obviously been doctored". In reality the line was deleted due to a typographical mistake. The attached three sheets

TYPOGRAPHICAL ERROR (Continued)

depict the page as first typed, as presented in Final Report and in its correct format. The original page highlights what occurred, and was given to the NRC at the December 1, 1982 meeting.

WELDING PROCEDURES

Page 29, section 5.3 of the Final Report addresses welding procedures and welder qualifications. It states that neither the specification nor the contract imposed any specific industry code or standard for HVAC welding. Zack did utilize recognized codes for qualifying their welding procedure specifications (WPS), procedure qualification records (PQR), and welder qualification test records. Braun's review of these records was based on technical feasibility and acceptable test results. Eighty out of 109 welders had all their tests complete. Twenty-one other welders had one or more complete tests.

The WPS's and PQR's and qualification test records are a record of Zack "paperwork". Braun's conclusion on weld quality was based on field inspection of thousands of welds and the fact that support welds were consistently adequate.

PROGRAM DEFINITION

Braun's Scope of Work and Work Plan are presented on page 5, Section 2.0 and page 10, Section 4.0, respectively, of the Final Report. The procedures and program were discussed with the NRC at the August 24, 1982 meeting in Region III office. Program requirements are further defined in Appendix B, Project and Quality Assurance Instructions.

The aforementioned topics present the information Braun presented at the December 1, 1982 Bethesda meeeting in response to the pertinent matters in the GAP report.

A. Lack of Informational Independence

C.F. Braun conducted this HVAC review with total informational independence. Commonwealth Edison supplied the necessary documents required to review the fabrication and installation of the HVAC systems. These documents included the HVAC-Work Specification (J-2590), all HVAC design ductwork and support drawings, pre-operational system tests, leak rate test reports, testing and balancing reports and Non-conformance (NCR) and Field Change Requests (FCR).

Braun's review of the material used in the HVAC ductwork and supports concluded that "the materials utilized in the fabrication and installation of the LaSalle County Station HVAC system are in accordance with applicable codes and standards and that they satisfy the intent of the design documents" (Section 5.3, Material). Braun's conclusion was based on their analysis of the results on material tests conducted by the NRC and CECo. Braun additionally concluded that the quantity and variety of samples tested by the NRC and CECo encompassed the representation of material used to fabricate and erect the HVAC systems. Moreover, it was determined by Braun that additional sampling was not required.

Braun's work plan regarding leak tests and balancing tests are referenced in Section 4.0, Page 10, 5th paragraph of their final report which states that the leak rate and balance tests will be reviewed in detail to verify system conformance to the design documents.

Additional verification of balance tests was performed as part of the Pre-Operational Test review. Braun reviewed CECo's Pre-operational HVAC testing program in accordance with the NRC approved scope as defined for the independent review. This included surveying the system operating tests performed by CECo to verify that the results confirmed the adequacy of the balance/leak rate tests.

GAP did not apparently review all the C.F. Braun Technical Correspondence when it referred to "six welding procedure specifications" purported to be all the applicable documents. A review of the correspondence in Braun's Appendix L of the report clearly shows that page 2 of the October 6, 1982 letter on Welding Dcoument Review (originally issued on September 4, 1982) was revised on October 14. The October 14 letter included WPS P7CS, Rev. 4. The October 6, page 1 and October 14, page 2, Welding Document Review letter lists 7 welding procedure specifications which agrees with page 7, Section 3.0, 7th paragraph of the report.

Braun's review of Zack paperwork concerning welding procedures and documents was supplemental information to support actual field inspections. Zack's records whether complete, incomplete or missing were not relied upon to reach the conclusions.

GAP's contention that CECo's control of the final fact finding conclusions was illustrated by the disposition of Braun's inspection reports is incorrect. In reference to QC-2-64 and the CECo response,

Braun simply overlooked the reference to note 14 which allows for the deletion of the bottom weld in certain situations. The CECo response merely points out this oversight.

We therefore believe that the review was conducted with informational independence.

B. Lack of Institutional Independence

C.F. Braun did conduct this review with total institutional independence.

Appendix H of the report contains the signed Independent Design Review Agreement forms as required by CECo's letter from B.R. Shelton to George Boddeker dated August 25, 1982 (Rev. 1). This letter was part of the accepted original work plan as outlined by C.F. Braun.

The Agreement contains three items as follows:

Item 1 Refers to Braun's independence. The information gathered would not be divulged to others such that they would prejudice the Braun conclusions. See Appendix B, page 6, Section 3.0, 1st paragraph of the report.

Item 2 Refers to procedures for reporting findings. See Appendix B, page B3-1 and B3-2 of the report.

Item 3 Refers to the freedom of substantial interest between Braun and CECo or Zack. Refer to B.R. Shelton letter dated August 25, 1982 (Rev. 1) Attachment A, page 6.

No ground rule changes were made at anytime as these Agreement forms were part of the work plan originated before the independent review started.

In order to set the record clear on auditing by CECo of C.F. Braun, Page 12, Section 5.1, 3rd paragraph of the report states "A member of CECo's operating QA group conducted an audit of Braun's conformance to the technical proposal requirements." The word "proposal" also appears on page 27, section 5.11, paragraph 2 of the report. The operating QA group reviewed Braun's conformance to the "special technical requirements" detailed in B.R. Shelton's letter to George Boddeker dated August 25, 1982 (Rev. 1). They did not review the "technical program requirements" as detailed in Appendix B, Project and QA Instructions.

CECo/S&L responses to field observations were all reviewed by Braun and dispositioned accordingly. It was not in C.F. Braun's scope of work to review the design of the HVAC system, only to verify that the HVAC field installation was in accordance with the design set forth by Sargent & Lundy. The C.F. Braun review, along with

additional material testing by the NRC and CECo was carried out as a result of allegations against the Zack Company made by former Zack employes. Sargent and Lundy's design process has not been in question as a result of the Zack allegations, and in fact, the S&L design process has been successfully reviewed by an independent reviewer - Teledyne (Ref. Teledyne Report May 28, 1982).

We therefore are confident that the review was conducted with institutional independence.

C. Faulty Methodology

The methodology used to conduct the HVAC review by Braun was not faulty. Braun's methodology was based upon sound engineering judgment. The approach consisted primarily of a verification that the field installation conforms to the design documents. Braun considered the type of equipment operating within the conditioned spaces, as well as the potential for failure of the installed HVAC components, when selecting items for detailed inspection. These procedures were discussed with the NRC, and other interested parties, at the August 24, 1982 Region III meeting.

Discrepancy, observation and finding are defined in Appendix B, page B3-1, Section 2.0. The procedures for classification are as follows.

First, the inspectors determined if there was a discrepancy. If the installation differed from the drawing it was called a discrepancy. The inspectors did not "interpret" the drawing, they applied it as shown.

Second, the QC supervisor reviewed the inspection form, QC-1, to verify that a discrepancy has been identified. He initiated a observation/finding report, QC-2, for any discrepancies.

Third, the site review team reviewed the QC-2 to confirm the discrepancy. When confirmed, it became an observation.

Fourth, the site review team determined if the observation should be considered a potential safety concern based on the criteria specified in Appendix B, page B3-2, Section 4.0.

Fifth, if it was a potential safety concern it was classified as a finding and forwarded to the internal review committee.

The definition of discrepancy was based upon a similar definition for "deviation" as noted in ANSI N45.2.10, Quality Assurance Terms and Definitions.

Braun's reasons for selecting the three HVAC systems for detailed review of the leakage and balance tests were as follows:

The Control Room HVAC system is essential for plant operation and shutdown.

The Reactor Building systems maintain secondary containment boundary.

The CSCS Equipment Room Cooling Systems are required for shutdown during accident conditions.

The reasons for not doing a detailed review on the other systems were as follows:

Zack installed approximately 10 feet of Standby Gas Treatment system ductwork. The major portion of the system was installed and tested by another contractor. The other safety systems are redundant or the balance/leak tests are not critical to their operation. The three nonsafety, seismically supported systems do not have to function after an accident, they just have to maintain structural integrity.

Braun agreed at the August 24 NRC Region III meeting, to consult with the "Zack whistleblowers" if Braun thought that their prior knowledge would be beneficial to the project. After reviewing the design and construction documents, and since Braun's plan encompassed a review of the installation versus the design drawings, it was

determined that there was no need to consult with these individuals. This is due to the fact that Braun inspected the finished hardware and did not concern themselves with the QA paperwork associated with that hardware. Braun did receive, and review, the July 26, 1982 GAP letter and found no new substantive items requiring review.

Braun did not increase the number of inspection packages because the discrepancy rate of the packages which were inspected was only 0.11 percent (Ref. C.F. Braun 12-13-82 letter to B.R. Shelton). Also, the Zack discrepancies were of a minor nature.

Therefore, the above methodology was in fact not faulty, but an excellent and proper approach.

D. Incomplete Disclosure of Results

Section 3.0 Conclusion and Section 5.0 Summary of Work were written to summarize the information provided in Volumes 1 through 4. The last paragraph of page 7, Section 3.0 Conclusions, provided a statistical evaluation of the observation/finding reports. Detailed data for other items can be compiled from a review of other sections of the report. For example, isolated cases of bad welds and missing bolt identification are noted on the observation/finding reports in Volume 4 and welder qualifications are detailed in Appendix L.

Again, Braun's review concentrated on the finished product as installed in the field. Field NCR's were reviewed because they directly involve changes to the finished product.

The information presented in Section 5.0, Summary of Work, is supported by specific details in other sections of the report. In the case of permissible variations for product analysis of material samples, the information is presented in Appendix L, page 2, of Leonard Boyd's letter on Material Sample Analysis dated October 13, 1982.

This contention is invalid as all the information has been disclosed and identified in the Braun report.

E. Suspect Subjective Evaluations, Instead of Conclusions Supported by Authoritative Citations

The conclusions and evaluations expressed in the report are based upon sound engineering principles, appropriate engineering codes and actual field review by responsible engineering personnel.

Braun's statement in Section 5.13, page 29, clearly indicates that no industry code or standard was specified for the HVAC welding program. Braun agrees that 10CFR50, Appendix B applies to the safety related HVAC systems. The welding program review was based on a technical assessment of the Zack procedures and a determination as to the acceptability of the test results.

Permissible variations for product analysis are part of the acceptance criteria for both the ASTM and ASME material specifications. Since all of the chemical test results were within the permissible variations, Braun determined that all the material was acceptable.

The design stress level for hangers was 18 ksi. ASTM A36 requires a yield strength of 36 ksi (not the 36,000 ksi stated in the GAP letter). Normal design practice utilizes a stress level less than the material yield strength.

The Braun site review team utilized engineering judgment and experience when reviewing inspection discrepancies. Some of the justifications included structural equivalency, metal to metal contact between anchor bolt nut and installed equipment and a field verification that the inspection discrepancies are valid.

Inspection form, QC-1, provides the details of the items to be inspected. Assessment of the merits of individual observation/finding reports must consider the information included in the referenced QC-1. As an example, in the case of QC-2-54, QC-1-117 shows ten stitch welds, each 3/4" long, plus 4 attachment clips. Those persons knowledgeable of the design documents immediately realized that the field installation is in excess of design requirements.

Although the scope of work did not include a detailed review of the S&L design, because the S&L design was not in question, Braun did review the S&L calculation procedures (reference page 24, Section 5.10.1, last 2 paragraphs) and the S&L procedures for resolving NCR's written against low system flows (reference page 8, Section 3.3). Based on these reviews and Braun's engineering experience and expertise in the design of similar type systems, Braun concluded that S&L had an acceptable system for design verification.

F. Failure to Verify All Necessary Corrective Actions

Braun is not aware of any discrepancies originally uncovered by the QC inspectors which "disappeared without any specific written rejection." Resolution of all such discrepancies was made visible and documented in the Braun report. Braun's responses to the cases alluded to in the GAP letter are as follows.

QC-2-69 Warped and/or rusted welds reported in QC-1-240 are "not defective." CECo's response addresses all discrepancies.

QC-2-72 references QC-1-266. QC-1-266 was initiated for the inspection of OVC01FB as shown on M-1377, sheet 2. The unit actually installed was OVC01FA and it was in accordance with the drawings. QC-1-265 was initiated for the inspection of OVC01FA. The unit actually installed was OVC01FB and it had a cutoff anchor bolt as reported on QC-2-73.

QC-2-76 CECo responded that they will replace a missing stud which was removed as a part of the NRC material testing program. This bolt was determined to be missing, independently, by Braun's program.

QC-2-78 The Braun site review team stated that "butt weld configuration is acceptable."

Appendix B, page B3-2 states that Braun's verification of the CECo responses encompasses a determination if the corrective action will restore the required design margins or if CECo's technical justification for maintaining the as-built condition is acceptable. Appendix L includes B.R. Shelton's letter of October 18, 1982 to T.E. Quaka requesting the site QA organization to provide complete follow-up inspection of all commitments made by CECo in their responses to the observation/finding reports.

Commonwealth Edison's drawing maintenance policy with Sargent & Lundy has always been to upgrade all drawings to reflect actual field conditions. In cases of minor differences, a judgment call is made based upon a determination of the overall importance of the particular change and its effect on the interpretation of the drawing, and only in very trivial cases are minor details not included on the final drawings.

ATTACHMENT 4

Commonwealth Edison Project Engineering has reviewed and dispositioned all C. F. Braun observations and findings. Certain items dispositioned have resulted in field work by Project Construction and their contractors. These items have or will be inspected by Commonwealth Edison Quality Assurance Department for acceptability. Upon completion of the above activities, C. F. Braun Observation QC-2-53 can be completed.

C. F. Braun required removal of fireproofing and insulation on ductwork during their site inspection activities. In addition, ductwork insulation was removed for previous Quality Assurance Department/Conam inspection activities. All locations of removed fireproofing and ductwork insulation are known. Restoration of fireproofing has started and is expected to be completed prior to March 1, 1983. Ductwork insulation restoration will begin December 20, 1982 and will be completed prior to March 1, 1983.

For those specific locations identified by C. F. Braun as requiring galvanoxing, the restoration work will be completed by February 1, 1983. Any other missing galvanoxing noticed during restoration work will be repaired. Project Construction Department/ Zack Company will conduct walkdowns of easily accessible ductwork and hangers to review for other major missing galvanoxing. Any other major missing galvonoxing will be repaired.

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ATTACHMENT 5

STATUS OF QUALITY ASSURANCE REVIEW

LaSalle Quality Assurance has monitored the repair and inspection of twenty-nine (29) observations identified as requiring field action in the CECo response to the C. F. Braun Independent HVAC Review, Final Report, dated October 27, 1982.

Except for Report No. QC-2-53, for which work has been held pending acceptance of the other work, all identified work has been completed, inspected and accepted by Zack Quality Control, and inspected and accepted by Quality Assurance's inspection contractor. A majority of the inspection contractor inspections were also witnessed by a LaSalle Q.A. Engineer/Inspector.

The remaining fifty-one (51) observations and two (2) findings did not require field action.

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ATTACHMENT 6

Unit 2 HVAC installation activites are substantially complete. At the present time, the Zack Company has only twenty-five (25) craft, quality control, clerical and supervisory personnel onsite. They are engaged in final ductwork and hanger walkdowns, system balancing support, minor revision work and documentation reviews. No major construction activity remains on Unit 2 HVAC systems.

In an effort to ensure the quality of Unit 2 work, the following steps have already been taken.

(1) The vast majority of Unit 2 ductwork and hangers were installed after the Zack 1979 and 1980 stop work orders. Since these stop work orders, the Zack Company has substantially upgraded their quality control program. The upgrade included replacement of unqualified quality control personnel. Commonwealth Edison Company monitored Zack's progress thru a 100% over inspection of shop and field welds on hangers by Quality Assurance Department/Conam. This 100% over inspection was continued until sufficient confidence in Zack's Quality Control Program was achieved. Additionally, evaluations of the 100% over inspection program for hangers conducted in July and August, 1982, substantiated the monitoring by Commonwealth Edison. Given this general upgrade, we believe that Unit 2 has substantially fewer discrepancies than were found in Unit 1 based on timing of installation. It should be noted that Commonwealth Edison Quality Assurance/Conam has continued to perform a 10% over inspection of Unit 2 systems. These inspection results continue to substantiate the upgrade of the Zack quality control program and the improvement in work quality.

(2) Observation Findings QC-2-88 and 89 represent the most serious discrepancy found by C. F. Braun. Project Construction/Zack Company Quality Control inspected additional 4x4x1/4 tube steel application to ascertain if a generic problem existed. The results show that a generic problem does not exist. This inspection is documented in the Zack Company Quality Control records.

(3) Quality Assurance Department/Conam conducted a sample inspection of ductwork welds for the Unit 2 systems. The sample results indicated a substantially lower discrepancy rate when subjected to a critical weld inspection. This sample inspection is documented and under review by our Engineering Department.

In summary, steps have already been taken and lessons have been learned to preclude the types of discrepancies found during the microscopic review conducted by C. F. Braun Company.