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MEMORANDUM FOR: Thomas M. Novak, Assistant Director
for Licensing
Division of Licensing

FROM: William V. Johnston, Assistant Director
for Materials & Qualifications Engineering
Division of Engineering

SUBJECT: REVIEW OF LASALLE FINAL REPORT FOR INDEPENDENT HVAC REVIEW (TAC #48619)

REFERENCES: (a) Ltr from A. J. Kempiak (C. F. Braun) to B. R. Shelton (CECo), dtd 10/27/82, w/attach (four volumes)

(b) Memo for R. Vollmer, et al, from D. Eisenhut, undated.

The Materials Engineering Branch has completed its review of the "Independent HVAC Review Final Report - LaSalle Station", dated October 27, 1982 (four volumes) performed by C. F. Braun. Attached is our SER input addressing the area of materials engineering.

William V. Johnston, Assistant Director
Materials & Qualifications Engineering
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Attachment:
As stated

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ATTACHMENT

REVIEW OF THE C. F. BRAUN REPORT ON LASALLE HVAC
MATERIALS ENGINEERING BRANCH

The staff has reviewed the LaSalle independent HVAC review final report dated October 27, 1982 by C. F. Braun. As stated in the report, the primary objective of the design review was to provide verification that the HVAC installation by the Zack Company was in accordance with the Sargent & Lundy design. However, because the Sargent & Lundy design was not in question, the scope of work did not include a review of the Sargent & Lundy design. There has been evidence in the investigation leading to the engagement of C. F. Braun in this review that materials specified by S&L has not been properly procured by Zack. There were instances of materials furnished to commercial standards rather than the ASTM Specifications required by S&L. Evidence was also provided that material was ordered by Zack to commercial standards rather than the S&L specifications and was furnished as ordered. However, it is true that the materials specified for ductwork and hangers are the same as those used in typical commercial and industrial use. The maximum design stress level is conservatively 18,000 psi as stated above. The strength level of the lowest grade of galvanized sheet metal and structural shapes available exceeds this value without exception.

To verify the grade of material installed by the Zack, both CECo and the NRC staff conducted material tests. CECo's test compared the carbon content with the allowables per the ASTM specifications. Of

those found unacceptable on the first test, a second test was conducted by CeCo and the material was found to be acceptable based on retests. Otherwise, all samples were confirmed as being of the proper type of material.

The NRC staff had chemical tests conducted on samples removed from ductwork, hangers, duct stiffeners, companion flanges and nuts and bolts. The quantity and variety of the samples tested encompasses a representative indication of the material used to fabricate and erect the entire HVAC system. The results of these tests were analyzed by C. F. Braun's structural engineer and the material specialist. The evaluation of these tests indicated that:

1. Several samples did not conform to the chemical requirements for heat analysis but were found acceptable.

2. Although the carbon content for the A563 nut was questionable, as it seemed unreasonably low for a carbon steel nut with a proof load strength of 97,000 psi, C. F. Braun found it acceptable.

3. Samples analyzed for the NRC staff were found out of tolerance; however, ASTM specification A29, General Requirements for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished contains

the following statement, "4.3.1 Merchant quality carbon bar steel and is not subject to rejection for product analysis unless misapplication of a heat is clearly indicated." Based on the above statement, these samples were acceptable.

4. All of the samples that were tensile tested indicated tensile strengths that exceeded the minimum requirements.

Based upon the above analysis, C. F. Braun concluded that the materials utilized in the fabrication and installation of the La Salle HVAC system, are in accordance with applicable codes and standards and that they satisfy the intent of the design documents.

Based on our review of the independent HVAC review final report, the staff believes an extensive review has been performed by C. F. Braun to resolve many issues other than the materials problems. The handling of the materials issue is judged to be sufficient for the class of materials involved. Most of the materials involved are quite tough and ductile, and the staff believes that C. F. Braun exercised reasonable judgment in resolving potential safety concerns identified in their findings. The staff further believes C. F. Braun has satisfactorily evaluated the substitution of commercial materials by Zach for those specified by Sargent and Lundy.

Thus, the staff concludes that from a materials engineering standpoint, the independent design review provides further assurance that the LaSalle HVAC systems are installed in accordance with the specified design requirements.