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From: Ground Support Engineering

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Subj: HVAC System Requirements
for Phase II of the
E-MAD Facility

ASTRONUCLEAR LABORATORY

MASTER

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- Reference: (1) NRDS E-MAD Facility Phase II - Post-Mortem Cells Air Flow Diagram - Dwg. #1425-K-101 - Vitro Engineering Co.
- (2) E-MAD Facility Phase II Preliminary Design, Vitro Report
ALX-1844

The HVAC System that has been proposed, according to reference (1) and (2), does not seem to be acceptable according to the hot cell operation criteria.

A. K-10 System

1. Scheme 1 would be acceptable if the motor operated louvered damper used as vent to the atmosphere was removed and a motor operated louvered damper as an inlet from the atmosphere was placed in the hot change room. This would allow better equalization of air while allowing very high flow through the hot change room when necessary.

2. The K-10.4-1 filter should be preceded by a filter of the 30% N.B.S type. This filtering system would prevent the natural dirt in the air from blocking up the filter and causing the filter to have to be continuously changed.

B. K-11 System

1. The hot cells system, modification of scheme 7, that has been proposed according to reference (1) has one very glaring error that must be changed. There must be a bank of two filters, 99.9% DOP, just prior to entry into the exhaust fans. This is, to the best of knowledge, an AEC requirement that when a filter is removed in one of the hot cells, it cannot cause exhausting of contaminated air.

2. One of the basic requirements within the hot cell is that the individual cells have independent control of the HVAC system. This is not supplied in the design of reference (1) and in addition, the suggested changes necessary to accommodate this type of operation would be less costly. This scheme

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is outlined in figure 1. The first point would be the elimination of the headers on the banks of cells, i.e., header for cells #161, #162, #163 - header #164, #165, #166 - header #170, #171 - header #168, #169. In addition, all lines would meet in one common outlet header that would allow a flow of 5,960 CFM. This unit would be controlled by a butterfly valve, motor operated, that would be located in the air-conditioning room near exhaust stack #2. There would be no other controls, besides a louver damper, motor operated behind the cell exhaust filter, and the aforementioned butterfly valve on the outlets of the cell. The controls must be accessible from the hot cell, cell service area, or the air conditioning room since if this were not the case, then it would be impossible to manually adjust or repair these controls. This would be impossible since the ducts, and therefore the controls, would be under the cells themselves.

3. In addition, all inlets would remain as indicated in reference (1) and a static pressure controller would be used for each cell individually as shown for cell #160.

4. The above changes will cost six extra static pressure controllers and twelve motor operated louvered dampers. It will eliminate four header banks along with the associated ten penetrations of the cell walls and eliminate 14 motor operated butterfly valves which could be switched from the HVAC panel. All of which would seem to be cost saving to the facility and better adapted to the requirements of the operating criteria.

5. In the past it has been found that if the incell filters noted in reference (1), filter 8% N.B.S., were replaced by a 30% N.B.S. filter, the life expectancy of the 99.97% DOP filter would be increased at least five fold. We would therefore suggest that this design be modified to allow for this saving of operational down time.

C. Reasons for Objecting Various Schemes

1. Scheme #5 - Scheme #5 as presented in reference (2), indicated that all motor operated butterfly valves controlling flow were on the exhaust side of the cell and therefore either each line would have to be run individually to the air conditioning room or else the valve would have to be located under the cell which would make them inaccessible for maintenance and repair.

2. Scheme #6 - Scheme #6 is unacceptable due to the fact that the only inlet of air for all cells is by a common header which would therefore allow all cells to become contaminated if contamination was produced in one cell. In addition, there is no way to prevent air from being pulled into a shut-down cell from an adjacent cell since the exhaust system is controlled as a bank.

3. Scheme #7 - Scheme #7 is unacceptable due to the necessity of the headers which would allow cross-contamination and also because it is our feeling that our proposed system is better. In addition, there is no way to prevent air from an adjacent cell since the exhaust system is controlled as a bank.

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