LICENSEE'S EXHIBIT 7

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD

Before Administrative Judge
Peter B. Bloch

In the Matter of THE CURATORS OF THE UNIVERSITY OF MISSOURI (Byproduct License No. 24-00513-32; Special Nuclear Materials License No. SNM-247)	Docket Nos. 70-00270 30-02278-MIA RE: TRUMP-S Project ASLBP No. 90-613-02-MLA

AFFIDAVIT OF VERYL G. ESCHEN
REGARDING ARGON GLOVEBOX EXHAUST SYSTEM

I, Veryl G. Eschen, being duly sworn, state as follows:

1. I am a senior engineer with Los Alamos Technical Associates, 6363 W. 120th Avenue, Broomfield, Colorado 80020, a position I have held for 11 months.

2. I received a B.S. in Metallurgical Engineering from South Dakota School of Mines in 1959 and an M.S. in Metallurgical Engineering from the University of Idaho in 1966. In addition to my current assignment, I have been employed by General Electric Co. 1959-1962 and 1970-1973; Argonne National Laboratory 1962-1970 and United Engineers and Constructors, Stearns-Roger Division and its predecessor organizations 1973-1989. I am a registered professional engineer in Idaho and Colorado. My resume is attached (Attachment No. 1).

3. My professional experience which represents over 31 years has been almost entirely associated with the nuclear industry and includes plutonium weapons production, remote reprocessing and fabrication of breeder reactor fuels, commercial fuel reprocessing, high level and TRU waste disposal, and evaluation of glovebox ventilation systems.

I participated in the design of a facility to characterize TRU waste and repackage for disposal at the Waste Isolation Pilot Plant located in New Mexico. While at Los Alamos Technical Associates, I have been associated with a project to evaluate DOE Order 6430.1A, "General Design Criteria" in comparison to existing standards at the Rocky Flats Plant located near Golden, CO. In addition, I have participated in a project that involves field investigations of existing glovebox systems at Rocky Flats, evaluates the glovebox exhaust systems and includes recommendations for improvement.

4. Los Alamos Technical Associates (LATA), Inc. was contracted by the University of Missouri-Columbia to perform an additional review of the ventilation system for the Argon Atmosphere Glovebox located in the Alpha Laboratory at the University of Missouri research reactor facility located in Columbia, Missouri (MURR). This project known as the TRUMP-S project involves the use of limited quantities of plutonium (up to 10 grams), neptunium, and americium (8 grams). The tests will be performed in the inert (argon) atmosphere glovebox located in the Alpha Laboratory at MURR.

5. On October 31, 1990 and November 1, 1990 I visited the Alpha Laboratory at the Missouri Research Reactor and inspected the argon glovebox and laboratory ventilation system to familiarize myself with the proposed operation and provide an analysis of the argon glovebox exhaust system and respond to certain intervenor's comments regarding said operation. The attached report entitled " "Description of Argon Atmosphere Glovebox Ventilation System at the University of Missouri-Columbia" summarizes the design and operation of the Argon glovebox (Attachment No. 2).

6. Intervenors have raised certain allegations concerning the adequacy of the argon glovebox filtration system mainly centered around the need for:

(1) Additional backflow filtration on the laboratory exhaust

(2) Two, testable in-place, HEPA filters on the glovebox exhaust system under abnormal conditions

Each of these will be discussed as it relates to the design and operation of the argon glovebox under normal and abnormal conditions.

7. Need for two, testable in-place, HEPA filters on the glovebox exhaust system under abnormal conditions.

Argon in the argon glovebox exhaust system is normally recirculated and only small quantities of argon are exhausted through three tested in-place HEPA filters (HEPA-2, HEPA-3, and HEPA-4), and one HEPA filter (HEPA-1) not tested in-place. While for purposes of a safety analysis, credit cannot be taken for a non-testable in-place filter, in practicality it does serve to protect the other exhaust HEPA filters by (a) reducing the dust loading, (b) preventing sudden physical damage or plugging, and, (c) under abnormal conditions, such as a fire, protecting the other filters from the heat for an additional period of time which allows for corrective actions to occur. Since the final, two-stage filter system provides a dual path to exhaust the glovebox and Alpha Laboratory, there is built-in redundancy to the system even in the event the first testable in-place HEPA filter is somehow destroyed and one of the pathways through the two-stage HEPA filter is somehow plugged. This would constitute at least two, simultaneous failures and is not a normal design requirement for safety systems under the single failure criteria.

8. Additional backflow filtration on the laboratory exhaust

Since it was the recommendation of Mr. Gerald Steppen, a MURR consultant, to install an additional HEPA filter in the Alpha Laboratory exhaust duct in the event of backflow, I contacted Mr. Steppen by telephone to determine why he felt such a filter was necessary. His reply was as follows, "to prevent particles trapped on the two-stage HEPA filter from becoming dislodged during a backflow event and entering the Alpha Laboratory".

I contacted Mr. Steppen in person and showed him a copy of the above paragraph and asked him if that was a complete and accurate account of the telephone conversation. He said it was. I then asked if there were any other reasons for his recommendation regarding the filter and after some thought he said that he was also concerned about backflow through the interconnection between the glovebox and laboratory exhaust.

This latter event would involve the failure of one or both of the emergency exhaust valves. If both paths of the dual path two-stage HEPA filter were to somehow become plugged, then the glovebox exhaust system could possibly overpressure and back-up into the Alpha Laboratory after being filtered by a single-stage HEPA filter. Again, this would require at least three simultaneous failures (the emergency exhaust valves and both parallel sets of HEPA filters) and then would admit argon that had passed through a single-stage, tested in-place HEPA filter (HEPA-2). Standard practice for air atmosphere gloveboxes is to provide a single-stage HEPA filter on the inlet. If overpressurization occurs, the glovebox atmosphere is vented into the work area through a single-stage HEPA. So, in this scenario even if two (or three) simultaneous failures occur, the resulting condition would still provide single-stage, tested in-place HEPA filtration into the work area which is standard industrial practice in the case of over-pressurization of air atmosphere gloveboxes.

For particulate to be dislodged from the filter and be transported into the Alpha Laboratory as hypothesized by Mr. Steppen at least three failures are required. One scenario would be the simultaneous failure of both fans on the building exhaust plenum (only one fan is normally required, and both automatically shift to emergency power if normal power supply fails) plus failure of the booster fan (also on emergency power) downstream of the two-stage HEPA filter plenum. This scenario is highly unlikely. The supply fan to the Alpha Laboratory would cause an over-pressurization in the laboratory and alarm before any possibility of backflow into the laboratory would occur. Failure of any of the fans would alarm in the

Alpha Laboratory and reactor control room and initiate corrective action. Additionally, the driving force for such an event is only a pressure differential of < -1.5 inches of water, which would have to overcome the pressure drop across one or more of the fans, two HEPA filters, and a roughing filter. Only very small flow rates, if any, would result. Hardly enough to transport particulates in the duct let alone dislodge them from a filter.

Consequently, the redundancy provided by the additional filter proposed by Mr. Steppen is not necessary.

9. Response to Intervenors' Allegation that the Alpha Lab contains a major design flaw (Intervenors' Exhibit No. 1, pp. 22-25, ¶ 80 through 92).

In paragraphs 80 and 85, the philosophy of the single failure criteria is expressed. As discussed above in paragraphs 6 and 7 of this affidavit, the Alpha Laboratory does meet the single failure and redundancy criteria of DOE Order 6430.1A, Section 1300-3.3.

Paragraphs 81, 82, and 86 of Intervenors Exhibit No. 1 state that all devices important to safety must be routinely tested under realistic conditions and that testing prior to installation is totally insufficient. Again the single-stage and dual path double-stage HEPA filters are routinely tested in-place under realistic conditions.

There is no requirement to my knowledge that provision to protect against "several things going wrong" with a safety system must be made as stated in paragraph 82. In fact, the single-failure criteria means that the design must only account for a single occurrence that results in the loss of capability of a component to perform its intended safety function(s). In the case of the Alpha Laboratory this would mean failure of the single-stage HEPA or a failure of one of the pathways in the two-stage, dual path HEPA filter and as discussed above the design accounts for the single failure event.

10. Response to Intervenors' Exhibit No. 9 which is a copy of excerpts from ASME N510-1989, "Testing of Nuclear Air Treatment Systems".

This standard provides guidance for the test methods to be used for the post-delivery DOP testing of installed air treatment systems. The in-place testable filters at the Alpha Laboratory have test ports as required by ASME N510 and are testable according to the procedures prescribed.

11. Response to Intervenors' Exhibit No. 10 which is excerpts from DOE nuclear standard NE F 3-41T, "In Place Testing of HEPA Filter Systems by the Single-Particle, Particle-size Spectrometer Method", December, 1981.

This standard achieves the same result as ASME N510-1989 but as stated in the scope simplifies the testing of multi-stage HEPA filters and allows the use of minimal amounts of challenge aerosol where very large (50,000 cfm) single-stage systems are tested. Either of the test methods described by ASME N510-1989 or NE F 3-41T are acceptable and the testable HEPA filtration systems at the Alpha Laboratory have the capability to utilize either method.

12. Response to Intervenors' Exhibit No. 7, Declaration of Kay Drey.

As has been discussed previously the ventilation systems for the Alpha Laboratory does have the capability to test, in-place the single-stage HEPA filter (HEPA-2) on the glovebox exhaust system and the two stage, dual path HEPA filters (HEPA-3 and HEPA-4) on the combined glovebox and laboratory exhaust system.

All HEPA filters do not have to be DOP tested. Only those for which credit is taken for a safety analysis. However, as discussed in paragraph No. 7 of this affidavit, the nontested HEPA filter (HEPA-1) on the glovebox exhaust does provide a degree of protection (for which no credit need be taken) for the downstream testable HEPA filters. As a minimum it would perform the function of a roughing filter or prefilter as described in DOE Order 6430.1A, Section 1550-99.0.2.

Additional concerns are expressed about the HEPA filters susceptibility to damage during installation and that they "can't take very high temperatures". While HEPA filters can be damaged during handling operations such as shipping and during installation, any physical damage would be uncovered during testing either before or after installation which is the purpose of in-place testing. Once the HEPA filter is in place and has successfully passed the testing procedures it is a reliable component as demonstrated by more than 40 years of service in the nuclear industry.

HEPA filters must pass certain elevated temperature tests performed by or at the request of the manufacturer. For example, the following is excerpts from the Nuclear Grade HEPA Filters Catalog, Flanders Filters, Inc. 1985.

> "The filters are constructed from either fire-retardant (self-extinguishing) or incombustible components and have been tested continuously at temperatures above the 250° F recommended for maximum, periodic service for twelve hours or more. Subsequent to the exposure they passed a second efficiency test. All components have been successfully tested for listing by Underwriters Laboratories for UL586 and for the qualified Products List (QPL) at Edgewood Arsenal. In both procedures the filters were exposed to temperatures of 700° F ± 50° F for a fifteen minute period. Following these heated air tests

CAUTION: Extended or repeated use of filters at elevated temperatures cause organic materials which have been treated with fire-retarding chemicals to accelerate in the aging process, to char and to dry out and become brittle, and may subsequently contribute to filter failure."

For the HEPA filters associated with the Alpha Laboratory to reach the 700° F maximum test temperature an abnormal occurrence such as a serious fire is required. n which case the laboratory operations would be shut down and an evaluation of the entire laboratory including the ventilation system would occur before restarting. Because the single-stage, testable HEPA filter (HEPA-2) is physically separated from the two-stage, dual path, testable HEPA filters (HEPA-3 and HEPA-4), the exhaust from a fire in the argon glovebox on the laboratory would be cooled significantly before reaching the two-stage, dual path, testable HEPA filters. Again this points up another advantage of the nontested HEPA at the glovebox. Namely, it does provide thermal as well as physical protection to the single-stage, testable HEPA on the glovebox exhaust.

13. Comments relating to the argon glovebox as being an "antique" were attributed to MURR personnel by the intervenors. Based on my experience (more than 31 years), basic glovebox designs have not changed significantly in that time. My observations were that the glovebox was in good condition and suitable for the application intended. The high purity argon atmosphere requires a tight (very low leakage system) and during my observations was operating properly.

14. As a result of this investigation it is my opinion that the argon glovebox ventilation system represents a reasonable "state of the art" system and meets the requirements of the program as presented.

Subscribed and sworn before me in BOULDER County, Colorado this 12th day of November 1990

Veryl G. Eschen
Veryl G. Eschen
Senior Engineer,
Los Alamos Technical Associates, Inc.

Kathryn R. Schietzelt
Notary Public

My Commission Expires 4/15/91

KATHRYN R. SCHIETZELT NOTARY PUBLIC STATE OF COLORADO

FIRST AMERICAN HERITAGE
6363 W. 120th AVE. #225
BROOMFIELD, CO 80020

VERYL G. ESCHEN

EDUCATION AND CERTIFICATION:

M.S., Metallurgical Engineering, 1966, University of Idaho
B.S., Metallurgical Engineering, 1959, South Dakota School of Mines and Technology

EXPERIENCE:

Corporate Affiliations: LATA, 1989 - present
Stearns-Roger, 1973 - 1989
General Electric Co., 1970 - 1973; 1959 - 1962
Argonne National Laboratory, 1962 - 1970

Areas of Specialization: Radioactive/Hazardous Waste Management
Materials Engineering
Process Engineering
Project Management

Years of Experience: 31

Security Clearance: DOE Q

Certification/Licensing: Registered Professional Engineer, Idaho and Colorado

Related Experience:

Currently, Mr. Eschen is working on two LATA projects at the Rocky Flats Plant. One project is to evaluate current Rocky Flats Plant standards as to their compliance with DOE Order 6430.1A. The second project involves the field evaluations of existing glovebox ventilation systems and performing several studies to provide recommendations on ways to improve filter sealing systems, inspect ducts for plutonium build-up, evaluate modifications to the ducts, and establish ventilation parameters to prevent particulate carry-over from process systems.

Before joining LATA, Mr. Eschen was a shift supervisor for General Electric Co., Hanford, responsible for the operation of a facility to cast, machine, and inspect plutonium weapon components. He developed casting procedures for a new casting operation.

As Project Manager for the U.S. Department of Energy, Idaho Operations Office, Mr. Eschen performed various plant and facility designs and modifications at the Idaho National Engineering Laboratory (INEL). He managed the conceptual design of a low-level transuranic (TRU) waste storage and processing facility, high-level waste (HLW) storage tanks upgrade, and NOx abatement pilot plant. All tasks were performed in accordance with DOE procedures.

For the Hughes Aircraft Company Space and Communications Group, he managed a project that provided Title I, Title II, and Title III A/E services for a radome and support facility at the Buckley Air National Guard Station near Denver, Colorado. The design included security systems, EMI shielding, and supporting electrical and mechanical systems.

In other project management assignments, Mr. Eschen supported the Los Alamos National Laboratory in the design of dual-axis radiographic hydrotest facility. He managed Titles I, II, and III engineering services for the design and construction of a facility to radiograph and produce high-speed photographs of the destructive testing of weapon components. For the Idaho

Department of Commerce on the Superconducting Super Collider (SSC) project, he supported the State of Idaho's Response to Invitation for Site Proposal. He directed the collection of existing geotechnical, environmental, and socioeconomic data regarding the INEL site and was responsible for the preparation of the responses required by the Invitation for Site Proposals.

For the U.S. Air Force, Vandenberg AFB, California, Mr. Eschen was project manager for evaluation of groundwater contamination of SLC-3, SLC-4, and sanitary landfill. The project required the collection and evaluation of existing analytical data from groundwater samples taken around the various launch sites and the sanitary landfill for presence of hazardous chemica Recommendations were made for additional test wells, and a preliminary SWAT prepared for the sanitary landfill. For the U.S. Army and Envirosphere at Rocky Mountain Arsenal, he was project manager for the Basin F Cleanup Project. This project analyzed suitability of Building 1611 facilities for use as a pilot plant to test incineration techniques to treat liquids and sludges from Basin F. For the U.S. Army Armament Munitions Chemical Command RDX Expansion Analysis, Mr. Eschen led the feasibility evaluation of constructing multiple, small-capacity production lines versus a large single facility for producing RDX explosives.

As project manager of a project for the Battelle Project Management Division, ONWI, he evaluated modifications to reference nuclear waste repository design concepts and provided source term data to support environmental assessments. He determined the construction schedule and evaluated constraints in meeting the requirements of the National Waste Policy Act for an operating nuclear waste repository. Source term data including time periods was provided for a waste repository at seven sites to support the preparation of the environmental assessments. A visual impact analysis of a repository located in Davis Canyon, Utah, was also part of the project.

Also for Battelle Project Management at ONWI, Mr. Eschen managed a project to develop repository design concepts and cost estimates. Site-specific conceptual nuclear waste repository designs for nine potential sites were developed to provide necessary data to assess viability of each site. As project manager for the Salt Test Facility, he developed a conceptual design and cost estimate for a test facility to measure and evaluate nuclear waste repository design parameters in salt.

For the U.S. Department of Energy (DOE), Mr. Eschen was project manager for Engineering Design Services. He provided Titles I, II, and III services for a facility to collect and incinerate hazardous liquid wastes located at Oak Ridge, Tennessee, in accordance with the Toxic Substance Control Act. Also for DOE at Oak Ridge, he was project manager for Titles I, II, and III engineering design services for several modifications to the coal-fired steam plant for the Y-12 steam plant facility. Mr. Eschen managed engineering design services for Phase II and III upgrades of support facilities at DOE production plants located in Portsmouth, Ohio; Paducah, Kentucky; and Oak Ridge, Tennessee. Also for Oak Ridge, he managed the cooling tower upgrade project at Paducah, Kentucky, including field inspections of existing cooling towers and structural analysis on three cooling towers to determine present conditions. The analysis was used to develop requirements for upgrading the towers to meet new seismic criteria and wind loads as well as extend the life of the towers by 20 years.

Mr. Eschen's engineering experience includes coal gasification and fossil fuel power plant engineering, and nuclear waste repository conceptual design. As a metallurgist, his experience includes materials engineering, oil shale development, petrochemicals, and coal gasification. As a process engineer for Stearns-Roger and GE, he studied and developed radwaste systems design criteria for nuclear power plants; planned engineering for a nuclear power plant; and coordinated the LMFBR fuels reprocessing study. He performed startup testing and evaluation of remote process equipment for the production of elemental fluorine, solvent extraction ion exchange, UNH calcination, UF_6 production, and gaseous and liquid waste handling operations.

As staff engineer at Argonne National Laboratory he participated in conceptual design and scoping the examination equipment for the Hot Fuel Examination Facility (HFEF). He evaluated experimental nuclear fuels and materials for irradiation in the experimental breeder reactor No. 2 and was in charge of assembling all experimental subassemblies. As Operations Manager, responsible for the operations of the fuel cycle facility, he scheduled activities and supervised 30 technicians and four facility engineers.

As staff engineer, he installed and made field modifications on remotely operated nuclear fuel reprocessing and fabrication equipment. He was also the responsible engineer for fuel element casting and inspection equipment and subassembly fabrication and testing operations. These included development of automated welding equipment and nondestructive testing systems such as eddy-current, ultrasonic, and radiographic testing.

DESCRIPTION OF ARGON ATMOSPHERE GLOVEBOX VENTILATION SYSTEM AT THE UNIVERSITY OF MISSOURI-COLUMBIA

Veryl G. Eschen
November 5, 1990

Introduction:

This description of the Argon Atmosphere glovebox ventilation system was developed from information gathered from the staff at the University of Missouri - Columbia research reactor facility (MURR) during a site visit on October 31, 1990 and November 1, 1990.

Description of Ventilation System

The ventilation system for the argon glovebox and the alpha laboratory is described in the attached schematics (see attachment No. 3). As shown in attachment No. 3, the argon glovebox exhaust is normally filtered through four (4) HEPA filters before leaving the facility through the building exhaust plenum. The HEPA filter at the glovebox labeled HEPA-1 is connected to the exhaust duct by a threaded connection, but is not tested in-place. The other three (3) HEPA filters (HEPA-2, HEPA-3, and HEPA-4) are tested in-place. The final two stages of HEPA filters provide dual flow paths (i.e. there are two parallel paths, each containing a HEPA-3 and HEPA-4 filter) with each path capable of handling the total exhaust flow of approximately 1000 cfm.

As shown in Attachment No. 3, the recirculating argon is also filtered through four (4) HEPA filters during normal operation. None of these filters are tested in-place currently.

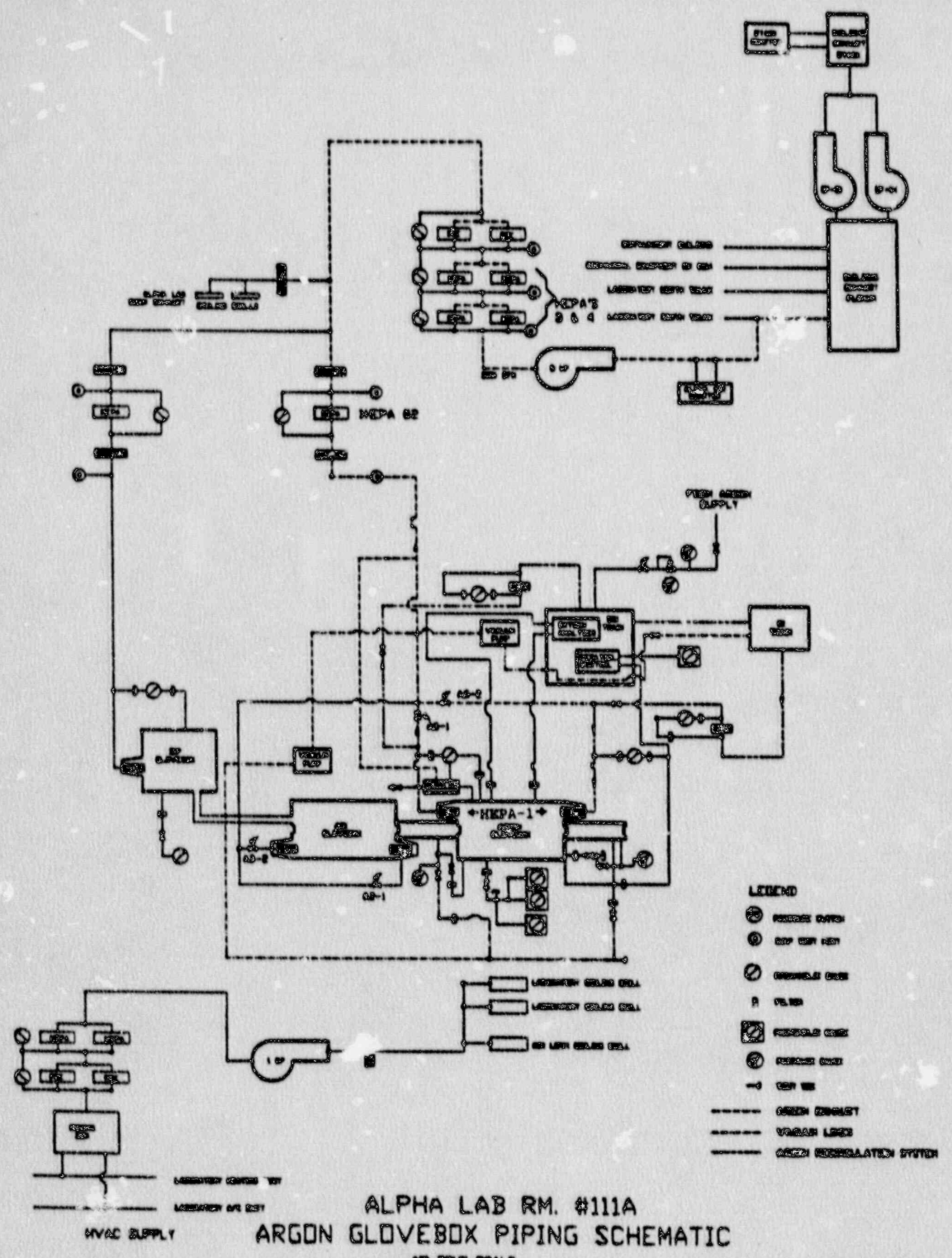
Normal control of the glovebox pressure is achieved by adding or removing argon gas from the system. Argon gas is added to the system whenever the glovebox atmosphere reaches a pressure less than -2.0 in. of H_2O. If the glovebox atmosphere exceeds -1.0 in. of H_2O, a vacuum pump is energized to remove argon until operating conditions are reestablished.

If the pressure in the argon box exceeds -0.1 in. of H_2O, valves AG-1 and AG-2 open to remove gas until the pressure is reduced to normal operating conditions (between -1.0 and -2.0 in. of H_2O). Overpressurization protection is also provided by the "bubbler" connected to the glovebox atmosphere and vented through the exhaust system.

Entry of materials into or out of the glovebox is through an air-lock system.

The supply air for the Alpha Laboratory is filtered through a single stage dual path HEPA system and the exhaust is filtered through the same two stage, dual path HEPA filtration system described previously for the glovebox exhaust system. If the Alpha Laboratory pressure compared to the facility basement gets out of the operating ban between 0.3 and 0.7 inches of H_2O vacuum (lab lower than the basement) alarms are activated in the Alpha Laboratory and the Control Room. If the laboratory vacuum is less than 0.1 inch of H_2O the supply fan shuts down; and if it exceeds 0.95 inches of H_2O, the exhaust and supply fans shutdown.

The atmosphere inside the Alpha Laboratory is continuously monitored for alpha activity and the ventilation exhaust system has a continuous alpha monitor and alarm system downstream from the two stage HEPA filter.



HVAC SUPPLY

ALPHA LAB RM. #111A
ARGON GLOVEBOX PIPING SCHEMATIC

NO TRUE SCALE

NOTES
1) HEAP FILTERS (01) LOCATED INSIDE THE ARGON GLOVEBOX ARE NOT TESTED IN PLACE.
2) SOLENOID VALVES [illegible] ARE EXHAUST VALVES.
3) THIS DRAWING IS FOR SCHEMATIC PURPOSES ONLY, SOME ITEMS HAVE BEEN OMITTED FOR CLARITY.

[illegible] DRAWING NO. [illegible]
DRAWN BY: [illegible]
DATE: 11/13/90
SHEET: 1 OF 1
APPROVED BY:
REVISION NO. 0
REVISION DATE: