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-MLA RE: TRUMP-S Project ASLBP No. 90-613-02-MLA

AFFIDAVIT OF WALTER A. MEYER, JR.
REGARDING EMERGENCY PLANNING

I, Walter A. Meyer, Jr., being duly sworn, hereby state as follows:

1. I am the Reactor Manager for the University of Missouri Research Reactor (MURR), a position that I have held since March 1, 1989.

2. I received both a B.S. in Electrical Engineering (Magna Cum Laude) in 1980 and a M.B.A. in 1984 from the University of Missouri-Columbia and am pursuing a M.S. in Nuclear Engineering from the University of Missouri-Columbia. I became a registered professional engineer (#E-22022) in 1986.

3. I have been employed at the MURR Facility since 1975 in the positions of Reactor Operator (1975-1977), Senior Reactor Operator (1977-1981), Reactor Maintenance Engineer (1981-1982), Reactor Shift Supervisor (1982), Reactor Operations Engineer (1982-1989). I was acting Reactor Manager from May 1985 to May 1987 and was formally appointed to this position on March 1, 1989.

4. Prior to my employment at the MURR Facility, I was an electronic technician and then a reactor operator for the U.S. Navy Nuclear Propulsion Program. I have completed formal training as a reactor operator in the U.S. Navy Power Training Program and for electronic technicians at the U.S. Navy Electronics Technicians School. My resume is attached as Attachment 1.

5. As Reactor Operations Engineer in 1982, I worked with the Reactor Manager and the Health Physics Manager in developing the upgrade of the MURR Facility Emergency Plan to meet new NRC regulations regarding emergency planning at research reactor facilities. Emergency planning, specifically relating to reactor emergencies and facility emergencies, was already in place prior to this time. In meeting the new requirements, we upgraded our existing emergency planning to provide for more formalized working agreements with outside organizations for responding if an emergency were determined to have the potential for offsite radiological consequences. This involved the addition of three emergency classifications, for which we developed implementing procedures for characterizing the emergency classifications, assessment actions, and specific corrective and protective actions relating to the emergency action levels. The upgraded emergency plan and implementing procedures were developed with the assistance of and consultation with representatives from each of the support organizations, including the City of Columbia Fire Department. The input and assistance of the representatives of the support organizations helped assure there would be little discrepancy between what was expected and what each support organization could supply regarding the MURR Facility Emergency Plan.

6. The Emergency Plan upgrade in 1982 defined the hierarchy of compatible implementing procedures. The Site Emergency Procedures (SEPs) were created to handle communicating and coordinating with offsite organizations if a facility emergency is determined to have potential for offsite radiological consequences. The Facility Emergency Procedures (FEPs) were in effect in 1974 when the University received the 10 MW reactor license. The FEPs deal with Facility emergencies that have primarily onsite consequences. If a Facility emergency is determined to have a potential for offsite radiological consequences, the appropriate SEP will be implemented. In this situation, the FEPs can be utilized as subprocedures to the SEPs. These implementing procedures for the Emergency Plan are augmented by the Standard Operating Procedures (SOPs) for Reactor Operations, Health Physics, Reactor Chemistry and now TRUMP-S Actinide Measurements ("TAMs") for activities related to the TRUMP-S program in the Alpha Laboratory. As Reactor Manager, I have assisted in the development of the emergency response procedures contained in the TAMs, as well as the licensed control room operator responses to Alpha Laboratory emergencies in Reactor Operations SOPs.

7. My responsibilities with respect to the MURR Facility Emergency Plan include the responsibility to plan and direct recovery operations after emergency response and the responsibility for maintaining emergency preparedness at the MURR

Facility. The latter responsibility includes training, planning and scheduling of emergency response drills, emergency plan review and update, and maintenance of emergency equipment. As Reactor Manager, I am one of four engineers (three, including myself, are licensed senior reactor operators) who, if not present, would be called in if an emergency event occurred. I am eligible by training and position to assume the Emergency Director position. Hence, I am qualified by background, experience and personal knowledge to attest to the application of the MURR Facility Emergency Plan and related procedures to an incident, including a fire, that might occur at the Alpha Laboratory.

8. I have reviewed the Written Presentation of Arguments of Intervenors and Individual Intervenors ("Intervenors' Written Presentation") (Oct. 15, 1990), including Exhibits 1, 11 and 12 thereof, and other relevant materials, including Intervenors' Renewed Request for Stay Pending Hearing ("Renewed Stay Request") (Oct. 15, 1990). I have also reviewed the Summary of Actions Taken During Conference Call of October 19, 1990 ("Summary of Actions"), which requires that:

> "b. Licensee will respond to Intervenors' allegation that the Columbia Fire Department would not fight a fire at the Alpha Laboratory involving radioactive materials, and Licensee will describe the arrangements with the Columbia Fire Department that provide assurance of an adequate response to a fire relating to the TRUMP-S experiments."

Summary of Actions, at 4.

9. In Intervenors' Written Presentation, they have alleged that the Columbia Fire Department (CFD) would not fight a fire involving radioactive materials at the Alpha Laboratory in the MURR Facility. They also allege that the Licensee either does not have an emergency plan that would apply to a fire in the Alpha Laboratory or that such plan is inadequate.

10. In order to provide the information directed by the foregoing section of the Summary of Actions, taking into account the relevant portions of the Intervenors' Written Presentation and Renewed Stay Request, this affidavit includes discussions of the following subjects:

1.) The MURR Facility Emergency Plan, which has been approved by the NRC and which applies to all activities within the MURR Facility, including the Alpha Laboratory in the basement of the MURR Facility.

2.) The general role of the CFD in responding to fires at the MURR Facility, including the Alpha Laboratory.

3.) The features of the Alpha Laboratory that would minimize the effects of a fire in the Alpha Laboratory.

4.) The procedures implementing and augmenting the MURR Facility Emergency Plan.

5.) The training for emergency preparedness that is provided both for MURR staff and for off-site emergency support groups, such as the CFD.

6.) The response that would be provided to a fire at the Alpha Laboratory by the MURR staff and the CFD.

7.) The answers to related allegations by the Intervenors not discussed above.

11. As will be shown in the response below, Intervenors have mistakenly alleged that the CFD will not fight fires involving radioactive materials at the Alpha Laboratory. Moreover, the arrangements with the CFD provide assurance of an adequate response to a fire relating to the TRUMP-S experiments.

The MURR Facility Emergency Plan

12. The MURR Facility Emergency Plan contains the elements of advance planning to cope with a broad range of emergency situations and focuses primarily on how to handle situations that may have the potential to cause radiological hazards affecting the health and safety of the MURR staff or the general public. The Plan outlines the objectives to be met by the emergency procedures and defines the authority and responsibilities to achieve these objectives. MURR Facility Emergency Plan at 1. The Plan applies to all activities within the MURR Facility, which includes both the reactor containment and the laboratories within the MURR building. Id. at 23, § 9.14. Thus, it is applicable to the TRUMP-S experiments being conducted in the Alpha Laboratory in the basement of the MURR Facility.

13. Contrary to the assertions in Intervenors' Written Presentation (at 6-7), the hearing file contains the MURR Facility Emergency Plan1/ and clearly indicates that the Plan

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1/ Moreover, the MURR Facility Emergency Plan was among the documents voluntarily made available by Licensee to Intervenors on June 26, 1990.

has been reviewed and approved by the NRC Staff. The NRC Staff supplemented the hearing file to include all the documents contained in the Part 50 docket for the past ten years relating to the adequacy of the emergency plan for the MURR Facility. See Letter to Peter B. Bloch from Bernard M. Bordenick (counsel for NRC Staff) dated August 16, 1990. These documents demonstrate that the MURR Facility Emergency Plan was first approved by the NRC Staff in 1984. Letter to Robert M. Brugger (University of Missouri) from Cecil O. Thomas (NRC) dated July 12, 1984. The hearing file also indicates that on four subsequent occasions the MURR Facility Emergency Plan was revised and that the changes were then transmitted to and approved by the NRC Staff.

14. The Emergency Organization at MURR is divided into two groups, the Facility Emergency Organization and the Emergency Support Organizations. The Facility Emergency Organization consists of MURR personnel from the Director's Office, Operations, Health Physics, and Reactor Chemistry groups who are on-site at the time of the emergency. MURR Facility Emergency Plan at 6. These groups currently are comprised of 4 full time engineering staff (three are licensed as senior reactor operators), 13 licensed control room reactor operators or senior reactor operators (a minimum of two who are on duty 24 hours a day, every day of the year), 3 health physicists, 2 reactor chemists, 2 health physics technicians, 4 machinists, and 2 electronics technicians. Other MURR staff members may be called in to assist as required.

15. The Emergency Support Organizations are those organizations which may be called upon for specific assistance based on the type of emergency. These Emergency Support Organizations are all composed of University of Missouri staff except for the CFD which will provide fire fighting and life saving support. Id.; See Letter to Director, University of Missouri Research Reactor Facility from Raymond A. Beck (Columbia City Manager) dated February 19, 1990 (Attachment 2). The University of Missouri Emergency Support Organizations are the MU Health Physics Services to assist with radiological assessment, MU Police to control access to the site area, University of Missouri Hospital and Clinics to handle medical emergencies, and the MU News Bureau to provide information to public and offsite authorities. MURR Facility Emergency Plan at 6.

16. The Emergency Director is responsible for the direction of the overall response in the event of an emergency. If the MURR Facility Director is present, he is designated as the Emergency Director. In his absence the Associate Director, the Reactor Manager and the Duty Shift Supervisor would be appointed in turn to serve as Emergency Director. Typically, the Emergency Director position would be assumed by the senior licensed

personnel on the site at the time of an emergency. His responsibilities include:

1.) identification and classification of the emergency;

2.) terminating the emergency conditions and initiating recovery actions; and

3.) if necessary, authorizing volunteer emergency workers to incur radiation exposure in excess of normal occupational limits.

Id. at 4.

17. The MURR Facility Emergency Plan describes three Standard Classes of emergency situations, grouping accidents according to the potential severity of offsite radiological consequences: 1) Notification of Unusual Events, (2) Alert and (3) Site Area Emergency. Id. at 8-10. For each class of emergency situations, emergency action levels, radiological assessment actions, corrective actions and specific protective actions are identified. See Table I of the MURR Facility Emergency Plan for typical action levels for each classification.

Role of Columbia Fire Department

18. The CFD has provided fire fighting and life saving support to the MURR Facility since 1966. As a result of the upgraded Emergency Plan in 1982, the City of Columbia has provided written assurance that the CFD will "respond to fires or other emergency situations should they occur at the research reactor." Letter to the Director University of Missouri Research Reactor Facility from Michael R. Sanford (Columbia, Deputy City Manager) dated August 24, 1982 (Appendix A, MURR Facility Emergency Plan). The most current commitment for the CFD to respond to a fire at the MURR Facility was provided on February 19, 1990. See Letter to Director, University of Missouri Research Reactor Facility from Raymond A. Beck (Columbia City Manager) dated February 19, 1990 (Attachment 2).

19. Intervenors' claim that the CFD would not fight a fire that involves radioactive materials at MURR is simply false. See Renewed Stay Request at 6; Intervenors' Written Presentation, at 49, 60; Intervenors' Exhibit 1, at 14-15, ¶¶ 51-52. The Affidavit of Erman L. Call (Battalion Chief for the Columbia Fire Department), which is being provided for the record by Licensee, states that CFD would fight a fire involving radioactive materials at the MURR Facility, including the Alpha Laboratory. See Affidavit of Erman L. Call, Exhibit A (October 24, 1990).

20. The fact that CFD would fight fires involving radioactive materials at the MURR Facility, including the Alpha Laboratory, is further evidenced by the following actions:

1.) The CFD has participated in biennial training of its personnel in fire fighting at MURR. See ¶ 37, infra. Moreover, six firemen from the two fire companies that would respond to the MURR Facility underwent an orientation tour of the Alpha Laboratory and associated facilities. See ¶ 39, infra.

2.) The CFD has participated in biennial emergency exercise drills at the MURR Facility which have included fires involving radioactive materials as part of the drill scenario. The latest exercise was held on February 12, 1990. See ¶ 38, infra.

3.) The CFD has inspected the installation of the Alpha Laboratory while it was under construction and has found it adequate from a fire safety point of view. See ¶ 32, infra.

21. The CFD provides both fire fighting and life saving support as an Emergency Support Organization under the Emergency Plan. See MURR Facility Emergency Plan at 6, § 2.3. The CFD, in its response to emergencies at MURR, coordinates all fire department and medical assistance personnel. See FEP-3 "Fire Procedure."

22. In responding to emergencies, the CFD sets up a command post for directing fire fighting and life saving efforts. The CFD official in charge, called the Incident Commander, and the Emergency Director for MURR stay in contact with each other during the emergency response, so that relevant information can be passed between the two emergency response teams -- the CFD and the Facility Emergency Organization. The Facility Emergency Organization provides information to the Incident Commander regarding location of fire, potential hazards in that location, and special instructions. The Facility Emergency Organization is also responsible for escorting the fire fighting team to the fire location to provide radiological dose assessment.

23. Because of the MURR Facility Emergency Plan, fire fighters who respond to MURR emergencies will be provided extensive information and assistance. They will be met by licensed reactor operators, themselves trained in emergency response, who can provide them with Facility layout maps, specific location of fire, particular hazards at the fire location (chemical and/or radiological), and assistance in planning ingress to deal with the fire. A member of the MURR

Facility Emergency Organization, either a health physicist or a licensed reactor operator, will accompany the fire team to provide radiological assessment as the fire location is approached. The escort, like the CFD will be attired in fire fighting clothing and a self contained breathing apparatus.

The Features of the Alpha Laboratory that Minimize the Effects of Fire In the Alpha Laboratory

A. Alpha Laboratory Location and Construction

24. The Alpha Laboratory is located in the basement area, outside the containment building. It is isolated by two fire doors, one going in each direction, at the top of the landing at grade level which leads to the inner and outer corridors of the laboratory building. The basement area is poured reinforced concrete construction on all faces, i.e., floor, ceiling and walls. In effect, the Alpha Laboratory is entombed inside a concrete vault isolated from the rest of the facility.

25. The Alpha Laboratory is a room constructed to contain all the experimental apparatus for the research program. The room has three access doors. One door serves as an equipment pass through, as well as an emergency exit. The other two doors are part of an airlock entry for normal personnel entry and exit. All three doors are equipped with surface mount rubber gasket seals which are mechanically activated when placed in the closed condition. Each of the airlock doors has a view window to observe who is in the area. A sealed plate glass window is installed in the south wall between the doors to allow observation of activities inside the Alpha Laboratory for safety purposes.

26. The Alpha Laboratory is designed to control the air supply and exhaust, with the capability to turn off ventilation fans and to isolate the room by closing the air supply and exhaust dampers. Should a fire or a radioactive air release occur, the room can be isolated and contained. This action would help starve the fire of oxygen and help contain any spread of smoke and/or radioactive release.

B. Fire Detection and Fighting Equipment in the Alpha Laboratory

27. The Alpha Laboratory is also equipped with a number of features to fight a small fire and to report the existence of a fire to the control room and thus initiate the MURR Facility Emergency Response Plan. The Alpha Laboratory has installed two (2) five pound Halon fire extinguishers (for use on electrical equipment fires), one just inside the Laboratory entry door and

one on the north wall. There is also one dry chemical extinguisher inside the Alpha Laboratory and one just outside the Laboratory.

28. The Alpha Laboratory is also equipped with smoke detectors within the Laboratory and a heat sensor within the argon glove box. Alarms for these sensors are displayed locally at the Alpha Laboratory on a 4 zone fire alarm panel and sounded remotely in the reactor control room (which is manned 24 hours a day, every day of the year by NRC licensed reactor operators).

29. The Alpha Laboratory glove box has alarms that signal low argon system pressure and high oxygen content. These alarms sound both locally in the Alpha Laboratory and in the reactor control room. These alarms allow response by Alpha Laboratory personnel and reactor operators well in advance of an oxygen level in the argon glove box that would support a fire.

C. Fire Fighting Equipment Available In Immediate Area Adjacent to the Alpha Laboratory

30. Four (4) five pound CO_2 fire extinguishers and one (1) dry chemical extinguisher are located in the basement area where the Alpha Laboratory is housed. The University Fire Inspector tours the facility at least once every six months and weighs and checks the status of every fire extinguisher, including those in the Alpha Laboratory, and applies an inspection date tag. Every five years, all fire extinguishers undergo hydro and operation tests by an independent testing laboratory. Tests of all fire extinguishers were completed in October, 1990. Reports are received by the Facilities Manager if any discrepancies are found with the fire extinguishers. The MURR safety inspector conducts monthly tours of the facility to identify safety related items. Fire extinguishers are checked for proper location and when the last fire inspection checks were made.

31. A dry (floodable) fire main system with fire hose connection box/valve fittings is located throughout the MURR Facility. The dry fire main system is connected to three (3) separate Siamese fire truck pumper hose connections located on the outside the Facility, one on each of the north, south, and west sides of the MURR building. Fire fighters attach hoses to the pumper hose connections to supply the water needed to fight an incident within the Facility. All of the valves and Siamese connection points have been checked and verified to be compatible with the equipment carried by the CFD. Two (2) dry fire hose box connection valves are located in the basement area within 65 and 80 feet of the Alpha Laboratory. This system allows fire fighters to fight a fire within the Facility, and specifically in

the Alpha Laboratory area without having to string hoses through fire doors. As a result of recent discussions with CFD, MURR staff is considering enhancing the system by placing hoses in each box and installing an additional dry fire box at the grade level landing.

32. The CFD was contacted about the installation of the Alpha Laboratory. The Fire Marshal and associated CFD officials toured the Alpha Laboratory and concluded that the safeguards and precautions incorporated into the design of the lab seemed to be adequate from a fire safety point of view.

Procedures Implementing and Augmenting
the MURR Facility Emergency Plan

33. The MURR Facility Emergency Plan is written in broad terms to encompass emergency situations that may occur in the course of operating the reactor or in the laboratories within the MURR Facility. The associated emergency procedures (Site Emergency Procedures (SEPs) and Facility Emergency Procedures (FEPs)) address the specific actions necessary to notify and mobilize the Facility Emergency Organization and the appropriate Emergency Support Organizations and provide further guidance on how to respond in the event of an emergency at the MURR Facility.

34. No modification of the MURR Facility Emergency Plan was required to encompass the Alpha Laboratory or the activities to be conducted therein; nor were any modifications required in the existing SEPs or FEPs. An additional FEP was issued on July 11, 1990 to direct the operator's response to a fire in the Alpha Laboratory. See FEP-3(a), "Control Room Response to Alpha Laboratory Fire" (Intervenors' Exhibit 12).2/ On August 14, 1990, I issued Standing Order 90-8 which modifies FEP-3(a) and directs the Emergency Director to inform the Incident Commander that the fire doors at the basement stairwell should remain closed if possible while fighting a fire in the Alpha Laboratory. See Attachment 4. This standing order emphasizes the existing practice that reduces the potential for release of smoke from the basement, which includes the Alpha Laboratory, into the ground level of the MURR Facility. In addition, Standing Order 90-6 was adopted to provide explicit guidance to control room operators on how to respond to alarms in the Alpha Laboratory. See Intervenors' Exhibit 19, at 442-46. This guidance has since been incorporated into the following Standard Operating Procedures: SOP VIII.8.1 "Response to Alpha Laboratory High Airborne Radioactivity Alarm (Exhaust and/or Room Monitor," SOP

2/ Intervenors' Exhibit 12 is an undated draft version of FEP 3(a). FEP 3(a) was issued on July 11, 1990 and is provided as Attachment 3 to this Affidavit.

VIII.8.2 "High Oxygen in Glove Box Alarm," and SOP VIII.8.3 "Low Argon System Pressure Alarm." (see Attachment 5).

35. In June of 1990, a number of operating procedures specific to the TRUMP-S Program, including emergency procedures for the Alpha Laboratory, were adopted. See TRUMP-S Standard Operating Procedures (June 1990)(these procedures are known as TRUMP-S Actinide Measurements ("TAMs")). Reference to the newest set of implementing procedures (TAMs) will be incorporated with the next substantial MURR Facility Emergency Plan review. The TAMs include:

1.) TAM-61 "Loss of Facility Argon Supply" supplies guidance to Alpha Laboratory personnel on the need to contact the control room after a loss of the argon supply (low argon supply pressure alarm) to the argon glove box. Argon is an inert gas that provides one of the fire safety features of the glove box. TAM-61 directs the Laboratory personnel on how to restore the argon supply and to secure the glove box and any oxygen sensitive materials if the argon supply cannot be restored. The low Argon pressure is also alarmed in the control room and would be responded to per SOP VIII.8.3 "Low Argon System Pressure Alarm."

2.) TAM-62 "High Oxygen in the Argon Glove Box" also directs Alpha Laboratory personnel on the need to contact the control room after the alarm for the glove box is triggered. If the source of the high oxygen levels cannot be identified, the Alpha Laboratory personnel are directed to secure the argon glove box and oxygen sensitive materials as described in TAM-61 above. The high oxygen content in the argon glove box is alarmed in the control room and would be responded to per SOP VIII.8.2 "High Oxygen in Glove Box Alarm."

3.) TAM-63 "Response to MURR Emergency Evacuation Alarm" provides guidance to Alpha Laboratory personnel on how to put their equipment in a safe condition before responding to the evacuation alarm (particularly in response to an emergency condition elsewhere in the facility).

4.) TAM-70 "Alpha Laboratory Fire" instructs Alpha Laboratory personnel on actions to take in case of fire in the Alpha Laboratory. This condition is also alarmed in the reactor control room and would be responded to by licensed operators in

accordance with FEP-3(a), "Control Room Response to Alpha Laboratory Fire."

5.) TAM-71 "High Airborne Radioactivity" instructs Alpha Laboratory personnel to shut off airflow from the Alpha Laboratory and contact the Control Room in the event of a high radioactivity alarm on the Alpha Laboratory room monitor or the Alpha Laboratory exhaust monitors. The exhaust monitor is also alarmed in the reactor control room, which would respond as per SOP VIII.8.1. "Response to Alpha Laboratory High Airborne Activity Alarms (Exhaust and/or Room Monitor)."

Training for Emergency Preparedness

36. All the personnel in the Facility Emergency Organization (i.e. the MURR Staff that could be called upon to respond in an emergency) are required to read and understand their responsibilities under the MURR Facility Emergency Plan on an annual basis. The licensed operators are also required to perform a separate review of the MURR Facility Emergency Plan as part of their annual requalification. Members of the Facility Emergency Organization also participate in an annual on-site emergency preparedness drill.

37. The Emergency Support Organizations (MU Police, MU Health Physics Services, MU News Bureau, University of Missouri Hospital and Clinics, and the CFD) train biennially on their role in emergency response. The MURR sponsored emergency preparedness training for the CFD encompasses the configuration of the MURR Facility, Radiological Health and Safety, and the location of chemical and radioactive materials in the MURR Facility. Fire fighters from the two stations that would be most likely to be called in an emergency situation at MURR also tour the Facility to familiarize themselves with the Facility layout. At least every two years the on-site emergency drills are coordinated with all of the Emergency Support Organizations. Representatives from these off-site groups assist in planning the drill and developing the specific emergency scenario.

38. There have been five emergency action drills performed under the Emergency Plan that was approved by the NRC in 1984. The first drill was conducted October 31, 1985 and involved all of the Emergency Support Organizations. Approximately once every two years the drills include representatives of each Emergency Support Organization (both the University of Missouri personnel and the CFD participate). The last such drill was conducted February 12, 1990 and it included representatives from each of the Emergency Support Organizations. This drill was conducted coincident with the UMC Hospital and Clinics radiation disaster

drill which was observed by the Federal Emergency Management Agency (FEMA). Each drill involving the outside Emergency Support Organizations were conducted as joint exercises with the CFD which provided direct involvement in planning and execution of the drills. Each of the biennial drills involving the Emergency Support Organizations (including the CFD) has included an exercise on fighting a fire involving radioactive materials.

39. Six firemen from the two fire companies that would respond to an emergency at the MURR Facility underwent an orientation tour of the Alpha Laboratory and associated facilities, during August of 1990. This orientation tour included an explanation of the configuration and fire control equipment for the Alpha Laboratory, the interaction with health physics monitoring personnel, and the definition of responsibilities between the Emergency Director and Incident Commanders.

40. The Licensee is continuing to discuss with CFD additional improvements in training of CFD and MURR personnel on fire fighting at the MURR Facility. The Licensee currently has the following possible enhancements under consideration:

1.) The Licensee is discussing with CFD developing an agreed upon schedule for additional and more frequent tours by Incident Commanders and fire fighters.

2.) The Licensee is also considering additional training sessions for fire fighters oriented toward general Health Physics and Radiological Controls (beyond the regularly scheduled biennial training).

3.) Consideration is also being given to providing additional training to some FEO and support staff, including hands-on fire fighting training at the Fire Training Academy.

41. The Alpha Laboratory personnel and the licensed reactor operators have trained on the radiation safety procedures for the Alpha Laboratory (TAM-30 through TAM-35); the procedures which deal with response to conditions that may be precursors to an emergency condition in the Alpha Laboratory (i.e., TAM-61, "Loss of Facility Argon" and TAM-62, "High Oxygen in the Argon Glove Box"); the emergency response procedures for the Alpha Laboratory (TAM-70, "Alpha Laboratory Fire," and TAM-71, "High Airborne Radioactivity"); and the Alpha Laboratory evacuation procedure (TAM-63).

42. This training included the identification of the location of chemical and radioactive materials in the Alpha Laboratory; a description of the Laboratory ventilation system, including location of dampers and fans; the location of alarm sensors and their indications; a description of the operation of the glove boxes; the Laboratory entry and exit procedures; and an indoctrination on health physics instrumentation specific to the Alpha Laboratory. This training was conducted by the staff engineer who helped design and build the Alpha Laboratory and a certified Health Physicist. These Alpha Laboratory personnel are also trained regarding their response to Facility Emergency Procedures.

43. Four members of the Health Physics Group and one member of the Reactor Chemistry Group who are all part of the Facility Emergency Organization have completed an eight and a half-day Radiological Emergency Response Course for Radiological Response Teams of State and Local governments sponsored by the Federal Agency members of the Federal Radiological Preparedness Coordinating Committee and coordinated by FEMA. They are all members of the Missouri Nuclear Emergency Team (MoNET).

Response to an Emergency in the Alpha Laboratory

44. As discussed above (¶¶ 28-29, supra), abnormal conditions in the Alpha Laboratory would result in alarms in the reactor control room at MURR (which is manned 24 hours/day, every day of the year by NRC licensed reactor operators). Thus, if a condition that might be a precursor to an emergency situation were to occur, the licensed operators in the Reactor Control Room would be immediately alerted.

45. The emergency situation for this scenario is assumed to be a fire in the Alpha Laboratory occurring at night or a weekend when only Control Room staff are present; at any other time, the full emergency response team is available at the Facility. The fire alarm would sound in the Reactor Control Room and a licensed operator would be dispatched to the vicinity of the Alpha Laboratory to determine the extent and specific location of the fire, to ascertain if any persons in the area are injured or require evacuation, and to verify that the fire doors to the basement are closed. At the same time, the Control Room operator would determine if any radioactive releases were occurring via the facility stack exhaust. Another operator would contact the CFD which would arrive in less than 10 minutes (based on three emergency drills with the CFD where the trucks were dispatched without sirens for reasons of traffic safety and arrived in approximately 10 minutes each time).

46. The shift supervisor (the most experienced NRC licensed senior reactor operator on shift) would assume Emergency Director responsibilities, which include identifying and classifying the emergency. Additional MURR response members would be called in: health physicists and technicians, engineering staff, University Police to secure access to the research park area, MU health physicists alerted as back up to MURR's health physicist, MU News Bureau to assist with public information releases and others as the Emergency Director deems necessary.

47. Depending on the severity of the fire and related circumstances, the Emergency Director may require the reactor to be shut down in order to concentrate the emergency response efforts on the Alpha Laboratory emergency. Electrical power to the Alpha Laboratory equipment may also be secured. Similarly, the ventilation system could be secured to reduce air flow to the fire.

48. When sufficient assessment information was available, the Emergency Director would classify the emergency, and notifications would be made to the NRC, State Emergency Management Agency and American Nuclear Insurers.

49. When the CFD arrived, they would be met by the Emergency Director or one of the licensed control room operators who would be in contact with the Emergency Director by portable radio. This contact person would provide the CFD Incident Commander with facility layout drawings and provide him with specific location of fire, particular hazards (chemical and/or radiological) and determinations of any known injuries or unaccountable persons.

50. The CFD Incident Commander with advice from the MURR Emergency Director would dispatch fire fighters to the location of the fire. The fire fighters would be escorted by MURR staff personnel (health physics or reactor operator) to determine radiological risk as the fire area is approached. Each fire fighter and MURR personnel would be equipped with emergency Self Contained Breathing Apparatus (SCBA) and fire gear for protection from fire and smoke. The fire fighters would charge water to the dry fire main and utilize Facility fire fighting systems, if needed, in order to keep fire doors to the basement area closed, except for access.

51. Intervenors seem to be concerned that there is no explicit procedure spelling out exactly how a fire involving radioactive materials, particularly transuranics, would be fought, or what a fire fighter should do. Intervenors' Written Presentation at 49. They are simply mistaken in their apparent belief that such a prescriptive procedure is necessary, or would even be useful.

52. The CFD would not require a procedure specifically for a fire involving transuranic in the Alpha Laboratory. They would use the same general precautions that they have learned in dealing with fires involving hazardous, chemical, or other types of radioactive material. The fire protection gear firemen use (fire coats and pants, with their SCBA) would provide them protection from any direct radiation from Alpha emitting particles and prevent them from breathing any Alpha emitting particles. The fire fighters always wear SCBA to fight all fires, because the smoke itself and the toxic materials it contains are hazardous.

53. The key to appropriately fighting a fire involving radioactive materials is to have present (1) capable fire fighting personnel, (2) facility personnel who are knowledgeable of the existing Facility and of radioactive and chemical contents of the fire location, (3) appropriate protective breathing apparatus and fire gear, and (4) suitable fire fighting equipment and resources, including the MURR Facility's (floodable) dry fire mains. When all of these are provided for, as they are under the MURR Facility Emergency Plan, the CFD Incident Commander, with the advice of the MURR Emergency Director can then make the appropriate decision as to how to fight that particular fire, taking into account the actual circumstances involved, rather than the specifics that would have to be written in any prescriptive procedure. It is the type of decision that fire fighters traditionally have to make in situations involving any hazardous substances; and the fire fighters will be better equipped to make such decisions at MURR than at many other locations because of the knowledge and assistance they will obtain from the MURR staff.

54. While the fire was being brought under control, MURR emergency response teams would be assessing the possible release of radioactive material, by monitoring smoke within the facility. The response team also has the capability to monitor for any radioactive material in smoke that might be released from the MURR Facility.

55. After the fire was brought under control, the persons previously engaged in fighting the fire would be checked and decontaminated for both chemical and/or radioactive contamination. Recovery actions would be by approved procedures based specifically on the assessment of contamination and damage created by the fire. Those procedures would be based on maintaining ALARA for the personnel doses associated with recovery operations.

56. Intervenors' claim that the fire response procedure for the Alpha Laboratory seems to be "get out and turn off the

ventilation system as you leave," is simply false. See Intervenors' Written Presentation at 49.

57. FEP-3 Fire Procedure is the general guidance for dealing with a fire emergency anywhere at the MURR Facility. FEP-3(a), Control Room Response to Alpha Laboratory Fire, gives additional guidance in dealing with a fire in the Alpha Laboratory. These procedures are not stand-alone procedures followed by untrained personnel. These procedures are part of the implementation of the Emergency Plan, which also includes Site Emergency Procedures (SEP) as well as other Facility Emergency Procedures (FEP). FEP-3(a) step 2 calls for the activation of the Facility Emergency Organization described in the Emergency Plan. These personnel are then mobilized to deal with the emergency and do not "just watch it [the fire] from the upwind side of the building . . ." Intervenors' Written Presentation at 20. Activating the Facility Emergency Organization triggers a number of emergency response activities not listed in FEP-3(a), but covered in other SEPs or FEPs. These include making assessments of radiological release, if any, and calling the Emergency Support Organizations or alerting them to possible need of their assistance.

58. The Facility Emergency Organization would initially engage any fires within the Facility, although the CFD would be called immediately, even if the Facility Emergency Organization could extinguish the fire. The policy is to call the CFD and not to assume that MURR Facility Emergency Organization will be successful.

59. If a large area were involved in fire, one of the primary rules of fire fighting would be to secure ventilation to prevent feeding the fire and to prevent spread of fire through the ventilation system. The decision to secure the ventilation would be made by the Emergency Director (a licensed senior reactor operator) after weighing all the risks of a fire in the Alpha Laboratory, the magnitude of the fire as well as any radiological risk.

60. The Emergency Director has, at his disposal, the ability to initiate a total area or selective area evacuation of persons from the MURR Facility for their own protection. FEP-1,. "Facility Evacuation Procedure." This procedure has two parts, one for actions by Facility Emergency Organization personnel and one for persons not assigned emergency response tasks (i.e., students and other non-FEO staff members). Persons not assigned emergency response tasks are, if evacuated, expected to go to the upwind parking lot, where the Emergency Coordinator determines the accountability of personnel. MURR Facility Emergency Plan at 5, § 2.2. Personnel with emergency response responsibilities will implement their assigned tasks.

Miscellaneous Intervenors' Arguments

61. Intervenors argue that the procedures for the TRUMP-S program (TAMs) are inadequate. See Intervenors' Written Presentation at 22, 32. Intervenors' sole explicit criticism relates to TAM-62, which they alleged "instruct[s the MURR] staff that the only reason to avoid air in the presence of the transuranic elements is that air can affect their purity, with no discussion of the pyrophoric nature of plutonium and related metals and the severe health hazard that such combustion could produce." Id. at 22. Intervenors have taken a sentence from a procedure out of context after having taken the procedure itself out of a much larger context--the entire set of TRUMP-S TAMs. TAM-62 is part of the sub-section titled "Response to Non-Standard Experimental Procedures". The purpose of this set of procedures is to guide already authorized experimenters in dealing with the nonstandard, non-emergency situations that may occur during the course of an experiment. An authorized experimenter would already have become familiar with other TAM procedures including those in sub-sections titled: "General Procedures", "Health Physics Procedures" and "Emergency Procedures" prior to encountering a need for TAM-62. See TRUMP-S Standard Operating Procedures, TAM-00 "Index to Procedures." In addition, any new experimenter will train at the side of an existing authorized experimenter prior to being authorized. This relationship is a very important mechanism in the transfer of knowledge, technique and safety considerations. To suggest that TAM-62 is an attempt by the Licensee to obscure information concerning the chemical reactivity of the actinides is without foundation.

62. The precise sentence from TAM-62 which the Intervenors contest, reads: "The small amounts of materials used in the TRUMP-S experiments eliminate fire as a concern, but valuable materials can be corroded by high oxygen levels." TAM-62 "High Oxygen in the Argon Glove Box," at 1 (June 25, 1990). The entire paragraph in which this sentence appears reads as follows:

> Actinide and rare earth compounds used in the TRUMP-S experiments are very sensitive to corrosion by oxygen or nitrogen present in the argon glove box. The small amounts of materials used in the TRUMP-S experiments eliminate fire as a concern, but valuable materials can be corroded by high oxygen levels. Oxygen levels of around 1 or 2 ppm will make certain experiments impossible. The oxygen level is normally kept at 0.1 ppm. This is a practical limit governed by the

purifying system used to counteract natural oxygen penetration into the glove box.

63. When read in context, it is apparent that the purpose of this paragraph is to alert the experimenter to the fact that the inert atmosphere in the Argon Glove Box is important to retain the chemical purity of the actinide materials, even though for reasons I describe below, there is little likelihood that these small quantities of actinides will self-ignite during the experiments. At room temperature, the actinides will form oxides and nitrides with only a few parts per million (ppm) of air in the argon atmosphere that would render experimental measurements of little value to the research.

64. The sentence selected by Intervenors was not intended to belittle the importance of the inert atmosphere as a fire safety feature. The experimenter would be familiar with the other TRUMP-S procedures, including TAM-70, under "Emergency Procedures," which states that maintaining an inert argon atmosphere, is the principal safety feature of the glove box. Thus, he/she would be aware that maintaining the inert atmosphere also has a safety origin.

65. Intervenors also ignore the remainder of TAM-62 which identifies the actions to be taken if the low oxygen cannot be maintained. The furnace control is returned to ambient and the electro-chemical cell is removed from the heating well and allowed to cool. Thus, precautions required to be taken are exactly the same, whether the purpose is protecting the material or preventing combustion.

66. Fire, combustion or burning of any material requires three components: (1) fuel (any oxidizable material), (2) oxygen (usually air) and (3) a certain temperature (heat). When TRUMP-S experiments are in progress, the amount of actinide materials in the glove box is less than 1 gram and not subject to contact by air because it is submerged under a non-combustible salt mixture or is in its sealed container. Thus, one of three necessary components (oxygen will be missing.

67. The only time pure metallic material in gram quantities (5 grams Pu, 2.4 grams Am) is in the glove box in an unsealed state is when two of these conditions are absent. This occurs only during the short period of time (about 2 hours) when smaller quantities needed for an experiment are separated from the larger quantity. While this process takes place, oxygen level in the glove box is <.1 ppm and the heater well is off. At least two persons are present during separation, the experimenter (an authorized user) and the Material Custodian. If any problem were to occur while these materials were being handled, immediate action could be taken to alleviate it. If the oxygen content

were to go up, the material would be placed back into its sealed steel container, although the addition of oxygen alone would not cause any material to combust. The heat necessary would still be absent. The uranium, neptunium, plutonium and americium metals will not self-ignite spontaneously in air at room temperature.

68. Intervenors have also raised the concern that if fire fighters pour water on the actinide materials, an explosion could occur. Renewed Stay Request at 6. In order to address the alleged explosion hazard of the quantity of actinide material used in TRUMP-S experiments, one must look at the conditions necessary for a material to explode. The handbook, Dangerous Properties of Industrial Materials by N. Irving Sax (p. 179) defines an explosive as:

> "Materials which under certain conditions of temperature, shock or chemical action can decompose rapidly to evolve either large volumes of gas, or so much heat that the surrounding air is forced to expand very rapidly . . . ."

Neither of these decomposition modes are possible with the quantities of the actinide material at MURR for use in TRUMP's experiments.

69. Using information provided by Professor Warf (Intervenors' Exhibit 1, attachment entitled "A Critique of the TRUMP-S Process (Including a Review of the Oxidation of Plutonium)" at page 4, item 1):

> "In describing the burning of plutonium metal, he emphasized that no flames are involved, only glowing, similar to the case of burning charcoal or graphite. This very electropositive metal oxides with evolution of 4.38 kJ/g. The metal generally melts, and smaller pieces are held intact by surface tension and an oxide layer, which also retards the reaction and is rate-controlling."

70. The products of unintended oxidation of these actinide materials would not be heated gases, but refractory oxide powders. And the energy release, if the entire quantity of plutonium (5 grams) material possessed by MURR were to burn, would only be sufficient to raise the temperature of a cup (250 ml assumed) of water 21°C or 38°F. This analogy is designed to place in perspective the absence of the risk of explosion of these actinide materials.

71. The addition of water by fire fighters, as hypothesized by Intervenors, could not cause an explosion. With the maximum quantity of actinide material involved in a fire, the addition of water might splatter particles of the materials, which is why water is not the extinguishing agent of choice, but can not result in an explosion because of insufficient releasable energy.

72. The TRUMP-S research being done at the MURR is basic electrochemistry that is carried out in a molten salt mixture at temperatures (400 to 500 °C) easily and safely maintained in a laboratory setting. The oxidation-reduction reactions are carried out in a small electrochemical cell in an inert argon atmosphere. The measurements do not require the use of flammable solvents, oxidizing acids, or other chemicals that could themselves be considered a fire or explosion risk.

73. We recognize that it is vitally important that measures be taken to assure that finely divided transuranic materials are not allowed to escape into the environment. We feel that by planning, design and prudence we have made a fire involving the actinide highly unlikely. This amount of actinide material cannot constitute the source of an explosion.

Conclusion

74. The MURR Facility Emergency Plan applies to all activities within the MURR Facility, which includes both the reactor containment and the laboratories within the MURR building. It provides a broad framework for implementation through Site Emergency Procedures and Facility Emergency Procedures, as augmented by Standard Operating Procedures and TRUMP-S Procedures. The Alpha Laboratory has extensive features that would minimize the effects of a fire. If a fire were to occur the MURR Facility Emergency Plan and associated procedures assure that an adequate response will be provided by the MURR staff and, if necessary, the Columbia Fire Department. The arrangements with the Department provide assurance that the Department will respond to and will fight a fire involving radioactive materials.

Subscribed and sworn
before me in
BOONE County,
Missouri this 29th day of
October 1990

Walter A. Meyer Jr.
Reactor Manager

Sharon Wesselman
Notary Public

Sharon Wesselman, Notary Public, State of Missouri
My commission expires February 21, 1991
Boone County, Missouri
My Commission Expires

2-21-91

ATTACHMENT 1
RESUME

WALTER A. MEYER, JR.

Work: Room 402
Research Reactor Facility
Columbia, MO 65211
314/882-5203

Home: Rt. 7, 2300 West Boiner
Columbia, MO 65202
314/442-7675

Education:

Currently	Pursuing Master of Science Nuclear Engineering
August 1986	Registered Professional Engineer, #E-22022
December 1984	Master of Business Administration (MBA), University of Missouri-Columbia
May 1980	Bachelor of Science in Electrical Engineering, Magna Cum Laude, University of Missouri-Columbia
May 1969 to April 1970	US Navy Nuclear Power Training Program/US Navy Electronics Technician Schools

WORK EXPERIENCE:

May 1975 to Present	University of Missouri Research Reactor (MURR), the highest flux and highest power research reactor at any US university. The MURR operates 24 hours/day, 7 days a week providing neutron radiation for research, education and industrial service.
March 1989 to Present	Reactor Manager. Direct the safe and reliable operation of the Research Reactor. Exercise functional and administrative supervision of seven professional/supervisory staff, 16 operators and one office support staff. Plan, assign and review work of the reactor engineering staff. Supervise and maintain documentation necessary to demonstrate continuous compliance with reactor license. Supervise or prepare reports to the Nuclear Regulatory Commission as required. Review, evaluate and approve all new experiments, tests, and facility modifications prior to implementation. Review and approve all reactor operating, safety, emergency and security procedures.
May 1985 to May 1987	Acting Reactor Manager (while the Reactor manager directed two years of the reactor upgrade effort). Responsibilities and duties described above.
July 1982 to March 1989	Reactor Operations Engineer. Responsible for the safe operation of the research reactor in conformance with Nuclear Regulatory Commission regulations. Supervise an operating staff of 16 operators including 4 shift supervisors. Additionally involved in revising operating procedures and engineering modifications to reactor system s and new component designs. Assume Reactor Manager responsibilities in his absence.
May 1982 to July 1982	Reactor Shift Supervisor. Responsible for the safe operation of the reactor in conformance with Nuclear Regulatory commission regulations. Supervise an operating shift of 4 operators.
August 1981 to May 1982	Reactor Maintenance Engineer. Responsible for providing engineering assistance to the facility and supervising the Electronics Shop. During this time interval had a major role in replacing the beryllium reflector and developing a facility Emergency Plan.
February 1977 to July 1981	Senior Reactor Operator
May 1975 to February 1977	Reactor Operator
May 1968 to May 1974	US Navy Electronics Technician and Reactor Operator

ATTACHMENT 2

CITY OF COLUMBIA

Office of the City Manager
(314) 874-7214

P.O. Box N.
Columbia, Mo. 65205

February 19, 1990

Director
University of Missouri
Research Reactor Facility
University of Missouri
Columbia, MO 65212

Dear Sir:

The City staff has reviewed the emergency plan for the MURR dated February 20, 1987. This letter will provide assurance that the City of Columbia Fire Department will respond to fires or other emergency situations should they occur at the research reactor.

Because of the potential for radiologic events coinciding with a fire fighting situation, I understand that the research reactor staff will conduct training sessions at least every two years for fire department personnel, including MURR facility orientation and review of selected health physics procedures specific to the MURR facility. The fire department will participate in such training; however, the responsibility for maintaining and scheduling the subject training will remain with the MURR staff.

Very truly yours,

Raymond A Beck

Raymond A. Beck, P.E.
City Manager

RAB/jh

cc: Fire Chief

FEP-3(a)

CONTROL ROOM RESPONSE TO ALPHA LABORATORY FIRE

NOTE: Throughout this procedure continue to monitor stack exhaust monitor, Alpha Laboratory exhaust monitor (ALPHA-6) or Alpha Laboratory room monitor (ALPHA-3) for indication of airborne radioactivity, as appropriate.

1. If a fire is detected by fire alarm or reported in the Alpha Laboratory, the shift supervisor (or senior licensed person in control) will call the Columbia Fire Department.

2. The shift supervisor will activate the Facility Emergency Organization by page system and provide warning to stay clear of facility basement.

3. The Emergency Director will determine nature and specific location of fire (i.e., if fire is in glove box or equipment exterior to glove box).

4. If fire cannot be put out immediately with local fire extinguishers, the reactor will be shut down to focus attention on the fire.

5. Ensure Alpha Laboratory doors are shut and personnel are out of the laboratory. If no experimenter is present, call the on-call experimenter as soon as time permits.

6. Secure EF-13 and EF-14 at breaker on emergency distribution center.

7. Secure facility supply and exhaust fans at MCC-3 and check all fire doors closed.

8. Secure electrical power to Alpha Laboratory at breaker 17 on 120/208V distribution center and breaker 2 on emergency distribution center.

   NOTE: This will secure Alpha Laboratory supply and exhaust fans.

9. Isolate Alpha Laboratory by closing supply and exhaust dampers, if possible.

10. The EMERGENCY DIRECTOR (or his delegate) should contact Fire Department outside of facility to provide specific information.

11. The EMERGENCY DIRECTOR will stay in contact with INCIDENT COMMANDER to coordinate fire fighting and life saving efforts.

12. Contact MU News Bureau to handle release of public information.

New 7/11/90 App'd

ATTACHMENT 4

Date: 8/14/90

Reactor Manager [signature]

Standing Order 90-8

This standing order is to remain in effect until it is incorporated into the FEP.

FEP-3(a) step 11:

The EMERGENCY DIRECTOR will stay in contact with INCIDENT COMMANDER to coordinate fire fighting and life saving efforts. The INCIDENT COMMANDER should be informed to keep the fire doors closed at the basement stairwell, if possible, while fighting a fire at the alpha laboratory to minimize or eliminate the chance for ground release. This will require charging and use of the dry firemain system.

This reflects the desire to force any smoke in the basement area out through the rm 114 filters either by exhaust fans or stack draft, which would be consider a stack release.

SOP VIII.8 RESPONSE PROCEDURES FOR THE ALPHA LABORATORY

The following procedures shall be used when responding to alarms from the Alpha Laboratory and the Alpha Laboratory Argon glove box.

NOTE: Maintaining an inert Argon atmosphere is the principal fire safety feature of the Argon glove box. The following alarms may not have immediate safety implications, however, they indicate a degradation in the fire safety feature of the Argon glove box and indicate a potential loss of glove box integrity.

SOP VIII.8.1 RESPONSE TO ALPHA LABORATORY HIGH AIRBORNE RADIOACTIVITY ALARM (Exhaust and/or Room Monitor)

1. Notify shift supervisor and Health Physics Manager.
2. Monitor readings on facility exhaust particulate monitor in control room. An assessment of the offsite radiological consequences shall be determined.
3. If the stack particulate monitor indicates a steady increase coinciding with an ALPHA-6 alarm, secure the reactor and EF-13 and EF-14 at the breaker on the Emergency Distribution Center.
4. Ensure persons have evacuated the Alpha Laboratory. If no experimenter is present, call the on-call experimenter as soon as time permits.

   WARNING: (Do NOT enter room except for life saving or accident mitigation efforts until Health Physics arrives.)

5. Secure the Alpha Laboratory exhaust and supply fans locally.
6. Shut the Alpha Laboratory supply damper only.
7. With Health Physics coverage, enter Alpha Laboratory using respirators to locate and repair source of airborne activity.

SUBSEQUENT ACTION: Assist recovery and decontamination procedures or the Alpha Laboratory and basement in vicinity of Alpha Laboratory.

SOP VIII.8.3 LOW ARGON SYSTEM PRESSURE ALARM

NOTE: This alarm may indicate an Argon system leak or a loss of integrity of the Argon glove box. (A loss of glove box integrity should also cause High Oxygen Alarm). The pressurized Argon gas bottles provide Argon makeup to the Argon conditioning system (a recirculating purification system) associated with the Argon glove box.

1. Call the TRUMP-S scientist on call. Contact Health Physics technician.
2. Check the Argon bank pressure at inner passageway. Replace bottles, if necessary.
3. Inspect Argon gas bottle system and Argon line to Alpha laboratory for leaks. Repair any leaks, if possible.
4. Before entering the laboratory, check the Argon glove box pressure indicated on the Photohelic gauge located on top of the Argon glove box.
   a) If it is the normal range (- 0.2 to - 1.0 inches of water) then there is no serious leak in the glove box.
   b) If pressure is near zero, then the possibility of a leak exists and the glove box should be visually inspected from the Alpha laboratory window.
5. Check the Alpha laboratory exhaust monitor and the Alpha laboratory room monitor for indication of elevated activity.
   a) If no elevated activity is indicated on either monitor, enter the laboratory by normal entering procedure, TAM-10.
   b) If activity is indicated, see SOP VIII.3.1, Response to Alpha Laboratory High Airborne Activity.
6. Check NITRAIN/DRI-TRAIN units for loss of electrical power (pressure control system is part of DRI-TRAIN unit).
7. Inspect Argon purification system and Argon glove box for leaks.
8. If Argon pressure cannot be restored in 60 minutes or if oxygen monitor alarms and indicates greater than 100 ppm, secure the Argon box well heater.
9. Exit Alpha laboratory by normal exit procedure, TAM-10.
10. Assist TRUMP-S scientist and Health Physics in determining corrective actions.

SOP VIII.8.2 HIGH OXYGEN IN GLOVE BOX ALARM

NOTE: The continuously operated oxygen monitor (located in the DRI-TRAIN rack) is the most sensitive indication of air leakage into the Argon glove box.

1. Verify no increased airborne activity on the stack monitor.
2. Contact TRUMP-S scientist on call. Contact Health Physics technician.
3. Before entering laboratory, check the Argon glove box pressure indicated on the Photohelic gauge located on top of the Argon glove box.
   a) If it is in the normal range (- 0.2 to - 1.0 inches of water) then there is no serious leak in the glove box.
   b) If pressure is near zero, then the possibility of a leak exists and the glove box should be visually inspected from the window to the Alpha laboratory.
4. Check the Alpha laboratory exhaust monitor and the Alpha laboratory room monitor for indication of elevated activity.
   a) If no elevated activity is indicated on either monitor, enter the laboratory by normal entry procedure, TAM-10.
   b) If elevated activity is indicated, see SOP VIII.8.1, Response to Alpha Laboratory High Airborne.
5. Check NITRAIN/DRI-TRAIN units for loss of power.
6. Check glove ports covered.
7. Check oxygen monitor reading. If reading exceeds 100 ppm, secure the Argon box well heater.
8. Investigate source of leakage and temporarily seal, if possible.
9. Exit Alpha laboratory by normal exit procedures, TAM-10.
10. Assist TRUMP-S scientist and Health Physics in determining source and corrective action.