ACCELERATOR DIVISION ES&H PROCEDURE

ADSP-02-0401

ACCELERATOR DIVISION EMERGENCY PLAN

RESPONSIBLE DEPARTMENT AD/ES&H

PREPARED BY _____ DATE 4/11/13
J. Anderson, AD/ES&H Dept. Head

AND _____ DATE 3/25/13
R. Lewis, AD/ES&H Dept.

APPROVED BY _____ DATE 4-11-13
R. Dixon, Accelerator Division Head

REVISION NO. 4 REVISION ISSUE DATE 4-11-13

CONTROLLED COPY NO. _____

REVIEW AND CONCURRENCE RECORD

REVIEWED BY Sylvia J. Wilson DATE 3-26-13
S. Wilson, Environmental Officer

REVIEWED BY G Lauten DATE 3/26/13
G. Lauten, Radiation Safety Officer

REVIEWED BY [signature] DATE 4/5/13
J. Theilacker, Head, Cryogenics Dept.

REVIEWED BY Daniel Johnson DATE 4/01/13
D. Johnson, Head, Operations Dept.

1.0 INTRODUCTION

1.1 PURPOSE OF EMERGENCY PLAN

This plan describes the Accelerator Division (AD) program for preparing for and responding to incidents within Accelerator Division areas. These incidents may evolve into situations in which the Emergency Response Organization of the Laboratory is requested to respond. The immediate actions of various Accelerator Division personnel in a supporting role to the Emergency Response Organization are described.

1.2 SCOPE

The Accelerator Division encompasses the accelerator complex, fixed target beamlines, and associated support and shop and office buildings. A complete listing of the buildings for which AD is responsible can be found at http://fess-ogfp.fnal.gov:8095/FermiFims/faces/fimsTblProperty/buildingManagerQuery.xhtml.

1.3 CONCEPT OF OPERATION

The Accelerator Division Emergency Plan is based upon hazards identified in the Accelerator Safety Assessment Document (SAD), the Hazard Assessment conducted by the ES&H Section, and other credible emergencies that could reasonably be expected to occur within the Division. Most hazards posed by the operation of the Accelerator Division complex are conventional ones normally associated with the industrial community. These are either routinely encountered and accepted by the general public or are dealt with through national codes and standards.

The unusual hazards posed by the operation of the Accelerator Division complex include radiation, cryogenics, potential oxygen deficiency, exposed electrical bus, and lithium. None of these pose an on-site impact which is capable of damaging a sufficient portion of the facility so that it cannot be returned to the operational state. However, if no credit is taken for the control and mitigation measures, the hazards do have the potential for causing serious injury to personnel.

Both the Operations Department and Cryogenics Department (for the Central Helium Liquefier, CHL) have written specific implementation procedures to be followed by their respective groups.

A separate specific emergency plan for the Antiproton Target Building (APØ) is provided as Attachment 3 to this Division plan.

1.4 FACILITY DESCRIPTION

1.4.1 Overall Description

The mission of the Accelerator Division is to make the particle beams provided by the accelerators available to qualified experimenters conducting high energy physics and particle beam physics research. In general the Accelerator Division areas are classified as light industrial with accompanying hazards befitting that classification.

1.4.2 Hazard Assessment

Within the Accelerator Division areas, virtually all of the areas (CHL is the exception) are designated as Controlled Areas (as defined in the Fermilab Radiological Control Manual). The majority of the buildings have various amounts of low-level radioactive class 1 materials. The places where higher levels can be expected are at the Antiproton Service Building APØ, Neutrino Target Service Building, and the C0 Assembly Building (Remote Handling Facility). In any case, the buildings have the necessary radiological postings in accordance with the Fermilab Radiological Control Manual.

The primary hazards for the beamline enclosures are radiation, electrical, and, in some cases, oxygen deficiency hazards (ODH). The beamline enclosures within the Division have radioactivated materials that range from normal background to hundreds of mr/hr at one foot. The most notable exceptions are the APØ, NuMI, and MiniBooNe target areas where the radiation levels may approach 100 R/hr at one foot. The target vaults are largely comprised of non-combustible materials and are generally inaccessible to personnel.

Large quantities of liquid helium and nitrogen are used in various locations for cooling of superconducting magnets. Calculations backed up by tests have shown several problems associated with the release of cryogenic fluids. The first is that as the cryogenic fluid expands from a liquid to a gas, there is a volume change of approximately 700 to 1. This expansion within a confined space or tunnel enclosure results in a dilution of the oxygen concentration to possibly less than life supporting. Helium also has the property of being lighter than air and would flow up an exit stairwell causing dilution of the oxygen in the stairwell. Cold nitrogen however is heavier than air and would stay at the floor level or flow into holes/pits. During certain failure scenarios, it is possible that large quantities of helium and/or nitrogen gas could be released in these areas that would result in Oxygen Deficiency Hazards (ODH). Warm or room temperature nitrogen will readily mix with room air causing dilution. The second problem encountered with the release of a cryogenic fluid is the extremely cold temperatures that could be generated in the immediate area of the spill.

Throughout the Division are various flammable storage cabinets that contain minor quantities of chemicals used in the light manufacturing processes within the work areas. These chemicals are, in general, not reportable quantities under SARA Title III (Superfund Amendments and Reauthorization Act, Emergency Planning and Community Right-to-Know Act). The quantities that are reportable are reported on an annual basis and the Fermilab Fire Department receives a copy.

The Accelerator Division has many large oil-filled transformers for electrical power supplies and utilities located throughout the complex. The inventory of these transformers and other spill sources is maintained by the AD/ESH Dept.and updated on an as-needed basis.

One environmental hazard within the Accelerator Division has been identified in the Fermilab Hazard Assessment for which a specific local plan is needed. That hazard is a large inventory of propylene glycol that could be spilled at CHL. That specific plan is incorporated into the AD Spill Control Plan (Attachment 2).

2.0 EMERGENCY RESPONSE ORGANIZATION (FACILITY)

2.1 ORGANIZATIONAL STRUCTURE

The Division Head is responsible for anticipating credible abnormal events within the Accelerator Division, establishing specific plans and procedures designed to prevent these abnormal events, and coping with those that occur. These responsibilities are delegated to the Accelerator Division Senior Safety Officer. The Division Head also appoints Emergency Wardens (EW) (a responsibility generally delegated to AD Department Heads) and other key personnel to implement the program.

The Division Senior Safety Officer (SSO) is responsible for administering and reviewing local area emergency plans including preparing, planning, reviewing, updating, training, and exercising the emergency response procedures. It is the responsibility of the SSO to assist in the selection of the Emergency Wardens and conduct their initial and annual refresher training. The SSO is responsible for coordinating drills and exercises and making recommendations for improvements in emergency preparedness.

Emergency Wardens are primarily concerned with life safety of personnel. The list of Emergency Wardens is available at http://www-bdnew.fnal.gov/esh/ad/emergency_warden_list.htm. Emergency Wardens are trained on initial responses to specific incidents that could reasonably occur within the Accelerator Division. Emergency Wardens are not trained to mitigate the incidents but to make evaluations of them and, if it is deemed to be significant, to carry out the following specific duties:

a. Sound the alarm and **DIAL 3131** to report the emergency, if not already done. Make sure that all personnel in the affected areas have been alerted.

b. Direct the evacuation of the affected area according to the Emergency Plan, or as instructed by the senior emergency person at the scene (refer to Section 2.2 for succession of command).

c. Meet the evacuated personnel in the designated assembly area. Make a list of those present. By interviewing those present, attempt to determine the names of any missing personnel and report accountability to the Incident Commander. This information may be relayed to the Incident Commander through the Main Control Room, if operational.

d. Be available to assist emergency personnel at the direction of the Incident Commander.

e. Meet the Fire Department or other emergency personnel and brief them on the area status and hazards.

Main Control Room Crew Chiefs are responsible for responding to the Incident Command Post as described in Section 5.1 below or when requested by the Emergency Response Organization. The Main Control Room Crew Chief provides technical advice to the Incident Commander on the status of the area involved in the incident.

2.2 EMERGENCY DIRECTION

In any local emergency situation, the succession of command shall be as follows (command authority listed in descending order):

a. Incident Commander or his/her Alternate.

b. Division Head or his/her Alternate.

c. Division Senior Safety Officer or his/her Alternate.

d. Main Control Room Crew Chief

e. Emergency Warden.

3.0 NOTIFICATION AND COMMUNICATION

3.1 NOTIFICATION

The primary notification of incidents in the Accelerator Division is via such things as panel alarms, warning signals, visual observations, etc. It is the responsibility of anyone observing an indication of an abnormal event to **DIAL 3131** if there is a possibility of the event requiring the Emergency Response Organization. If the event is deemed not to be an emergency, the Main Control Room Crew Chief should be called for technical advice on who should be contacted. If an abnormal event is declared by the communication center, an appropriate code and/or notification over the Site Wide Emergency Warning System (SEWS) will be issued. These systems are monitored in the Main Control Room.

3.2 COMMUNICATIONS

In any abnormal situation, full utilization must be made of all existing communications systems. The primary system is the telephone network through the emergency dispatch operator who can be reached at any time by **DIALING 3131**. In addition, the Accelerator Division has its own public address system (for the Footprint Area and the accelerator enclosures) and its own portable radio transceivers and cellular telephones which should be used in conjunction with, and as back-up to, the telephone system. The public address system can be operated from the Main Control Room. The portable radio transceivers and cellular telephones are available in the Main Control Room.

The local area command post is the Main Control Room. The alternate local area command post is one level down from the Main Control Room.

The telephone extension numbers in the Main Control Room are:

a. 3721
b. 3194
c. 3197
d. 3195
e. 3196
f. Direct outside line: 879-2637
g. Fermilab Operator - Direct outside line: 879-5365

4.0 CONSEQUENCE ASSESSMENT

It shall be the responsibility of the senior Accelerator Division personnel at the scene to constantly review any ongoing incident and **DIAL 3131** if it is not being adequately controlled by the local organization or it reaches any of the trigger points in the section on **PROTECTIVE ACTIONS.**

5.0 PROTECTIVE ACTIONS

The following actions are to be taken by personnel within the Accelerator Division. The listed actions of various personnel within the Division are not those of Emergency Responders, but rather the actions deemed necessary to investigate and evacuate affected personnel at the outset of an emergency and to provide the support of division personnel as technical experts to the Laboratory Emergency Response Organization.

5.1 INITIAL RESPONSE GUIDELINES

In general, when an emergency situation is found to exist, it is important that the following steps be taken by the first person on the scene.

a. **Dial 3131** to report the emergency. The Emergency Operator will contact the appropriate response group.

b. If possible, clear the area of personnel or otherwise remove the immediate danger if this can be done without jeopardizing more personnel.

c. Prevent other personnel from entering the hazard area.

In general, the call to the Emergency Operator at x3131 will result in a response to the incident scene by Fermilab Fire Department and Fermilab Security personnel (members of the Laboratory Emergency Response Organization). An Incident Commander may be designated who is formally in charge of the response to the incident. (If an IC is not formally designated, a responding Fire Officer will essentially serve that function.) The role of AD personnel is that of Technical Advisor to the IC. In addition, AD personnel may be requested to provide specialized services, such as radiation monitoring, operating AD equipment, and accompanying Emergency Response personnel on accesses into AD areas. If AD personnel do accompany ERO personnel into an area, the AD personnel should be provided with personal protective equipment equivalent to that used by the ERO personnel they are accompanying.

For incidents that involve interlocked Accelerator Division enclosures, the IC may direct FFD (or other ERO) personnel to make an access into the enclosure(s). Such "Emergency Accesses" (i.e., an access to an enclosure by ERO personnel during the response to an emergency incident) are <u>not</u> subject to the normal rules for enclosure access. The basic aspects of an Emergency Access that should be adhered to are as follows:

a. The ERO personnel are <u>not</u> subject to any Accelerator Division restrictions during the response to an emergency. That means that AD does <u>not</u> impose any training or equipment requirements on members of the ERO entering an enclosure on an Emergency Access. Note that ERO personnel have their own radiation monitoring equipment and are <u>not</u> subject to normal radiation exposure limits during emergency operations to preserve life and property; special exposure limits (higher than normal occupational limits) have been specified for those activities. ERO personnel are equipped with SCBA and oxygen monitoring equipment of their own which mitigate the hazards that might be present due to an oxygen deficiency condition.

b. To facilitate investigation of in-tunnel alarms, Fire Department personnel have been trained in Controlled Access procedures. If

the Incident Commander, in consultation with the Crew Chief, decides that it is safe for Fire Dept. personnel to do a Controlled Access into an enclosure to investigate an alarm, then they will follow normal Controlled Access procedures for that investigation, accompanied by an operator when feasible. However, they are authorized to gain access to an enclosure in any way they see fit given the urgency of the situation. This may include using an axe (or other tools) to physically remove a door and then physically tripping the interlock switches on the door to drop the Radiation Safety System (RSS) and Electrical Safety System (ESS) for the area, thus disabling the beam prior to their actual entry into the enclosure. In most situations, however, it is possible for access to be gained in a more conventional manner. If at all possible, the following steps should be carried out by MCR operators if ERO personnel indicate they will be making an Emergency Access:

i. Turn off beam to the enclosure to be entered.

ii. Disable the RSS and ESS for the enclosure.

iii. Pull one key from the key tree for the enclosure and deliver it to the Incident Commander.

iv. Turn off the power supplies feeding accelerator components in the enclosure.

v. If there are indications that the emergency situation will not be resolved for a considerable period of time and if sufficient Operations personnel are available, begin Configuration Control Lock-Out of the affected enclosure.

5.1.1 EVACUATIONS

If an emergency requires an evacuation, it will be effected via the nearest safe exit.

For all emergencies requiring evacuation, except national alerts and tornadoes, all personnel are to assemble according to the following plan to permit an effective accounting of personnel. If smoke, vapors, etc. from the incident affect the designated assembly area, personnel are to move to a safe location at their own discretion or upon direction of Emergency Response Personnel. Evacuated personnel are to stay clear of doorways, paths, and roads which will be used by Emergency Response Organization personnel arriving at the scene.

Building/Area Evacuated	Designated Assembly Area
Cross Gallery, Linac Gallery, & Transfer Gallery	Horseshoe parking lot between the Main Control Room and Wilson Hall
East Booster Tower & East Booster Gallery	East Booster Tower parking lot
West Booster Tower & West Booster Gallery	West Booster Tower parking lot
A0 Lab Area	Parking lot at south end of A0 by F4 Service Building

Other Accelerator Division Buildings	Parking lot nearest the building

The order to evacuate is the responsibility of the person in charge at the scene as defined in Section 2.2 Emergency Direction.

5.1.2 FIRE

5.1.2.1 Initial Indication, Evacuation, and Investigation

CAUTION: Only personnel who have received annual training in the use of fire extinguishers should use them. Only Fire Department personnel should use the reactive metal extinguishers located at AP0 (for lithium) and Linac Lower Level (for cesium).

CAUTION: Some fire protection systems are designed to flood a building or area with an extinguishing agent in order to put out a fire. Personnel should evacuate such areas prior to discharge of the agent due to **possible** adverse health effects from exposure to the agent. Of particular note are the dry chemical systems that are installed in some of the helium compressor buildings. The discharge of these systems floods the area with a fine non-toxic powder in order to smother a fire. This same powder **could** cause respiratory distress if an individual were to be in the building when it discharged. These dry chemical systems require two independent indications of an alarm before activation. Normally there is a thirty second delay after the alarm before the dry chemical is discharged. However, when the first alarm goes off, there is no additional local alarm that would indicate the system was about to discharge. Evacuation of the area should begin immediately upon activation of the initial alarm.

Fires are indicated by alarms, direct visual observation, and response by the Fire Department.

All fire alarms received shall be immediately investigated by the area Emergency Warden in addition to the operators dispatched by the Main Control Room Crew Chief following the guidelines established below for regularly occupied and regularly unoccupied areas.

In regularly occupied areas (Footprint area, portakamps, F0 and MI-60, MI-8, E4R, MW9, and NWA), personnel shall be evacuated from the area of the alarm. Emergency wardens in the immediate area should ascertain the validity of the alarm following evacuation. If smoke is noted, **3131 shall be called** and personnel shall be evacuated from the hazard area. If the smoke is only a light haze and the warden can put the fire out without endangering himself/herself or others, then he/she may use an extinguisher (if appropriately trained); otherwise, the warden will evacuate and wait for the Fire Department.

In normally non-occupied areas (service buildings, refrigerator buildings, helium compressor buildings, etc.), personnel shall immediately vacate the building. No entry/reentry will be permitted until after Fire Department personnel are at the scene.

5.1.2.2 Actions To Be Taken Upon Confirmation of a Fire

In the event a fire is confirmed in a **non-radiation area**, the following action shall be taken.

a. Extension **3131** shall be called to confirm the presence of a fire.

b. The MCR Crew Chief or designee will immediately proceed to the scene and take the actions listed below as long as he/she is not in danger:

   i. Ensure that power is off to burning equipment.

   ii. Act as an advisor to the Fire Department personnel to inform them of the hazards involved.

   iii. Evaluate the extent of the damage and repairs necessary.

In the event a fire is confirmed in a **radiation area** or involving **radioactive material**, the following actions shall be taken.

NOTE: Fires that involve radioactive materials are particularly hazardous because of the potential for breathing radioactive smoke.

a. **DIAL 3131** and report a fire involving radioactive material.

b. All personnel shall be evacuated by the nearest safe exit to a safe point removed from any smoke and remain there until checked by Radiation Safety Personnel. All potentially exposed personnel **must** remain in a safe place until they can be monitored for possible contamination.

c. The Main Control Room Crew Chief or designee will immediately proceed to the scene to represent the Accelerator Division but no entry shall be made into beam enclosures containing smoke by non-Fire Department personnel until Radiation Safety personnel are available. (See Section 5.1 above for a detailed discussion of Emergency Accesses by FFD personnel.) In general, Fire Department personnel will not enter where extremely high radiation areas might exist except for lifesaving. No personnel or equipment will be permitted to leave the scene of the fire until Radiation Safety Personnel are available and have monitored for contamination. Any personnel or equipment found contaminated shall be dealt with as per radiation control procedures.

d. Any entrance into an area involving burning radioactive materials shall only be by personnel wearing SCBA equipment.

At the discretion of the Incident Commander, a Accelerator Division representative familiar with the enclosures may accompany Fire Department personnel on an access to determine the actual location and extent of the incident. If this occurs, the person shall be appropriately trained on, fitted for, and wear an SCBA provided by the Fire Department. In addition, the AD personnel shall carry an LSM Radiation Meter (or equivalent) in addition to their normal dosimetry (FFD personnel have their own alarming dosimetry). The AD member of the investigation team shall not enter a radiation field greater than 1 Rem/hr unless the Radiation Safety Personnel are available to advise the team (FFD personnel are subject to their own limits for radiation exposure in lifesaving or property protection situations). If other than light smoke is encountered, the Fire

Department Personnel shall evacuate the Accelerator Division personnel.

5.1.3 RADIOACTIVE CONTAMINATION

5.1.3.1 Contaminated Individuals

Personnel might become contaminated with radioactive material through an authorized entry into a contamination area or through an accidental occurrence, such as a broken radioactive source or spill of radioactive material. Ordinarily, such contamination does not pose a serious health hazard to the contaminated individual(s) or emergency responders. The primary concern is to prevent the spread of contamination.

When personnel clothing or the skin of an individual is found or suspected of being contaminated, carry out the following steps:

a. **DIAL 3131** and report a personnel contamination problem. Request response of Radiation Safety Personnel.

b. Instruct the contaminated individual(s) to refrain from moving from their immediate area to the extent practical. If there are other hazards in the immediate area (e.g., fire, high radiation levels), then the contaminated individual(s) should be moved to a safe location and remain there until assistance arrives.

c. Prevent other people from entering the immediate area near the contamination unless they are wearing the appropriate protective clothing.

Decontamination of people and the area will be performed by Radiation Safety personnel and should not be attempted by others.

5.1.3.2 Spills of Radioactive Materials (Wet and Dry)

See Section III of Attachment 2, Accelerator Division Spill Control Plan.

5.1.4 BEAM-ON EXPOSURE

A beam-on exposure occurs when a person is irradiated by a particle beam directly or indirectly (beam spray). Beam-on exposure should be expected if someone has been in an exclusion area (an area in which access is not allowed) during beam transport.

Quick response is necessary in any suspected beam-on accident. Immediate medical attention is only necessary if other injuries are present. Of primary importance in beam-on accidents is the determination of dose received by the victim - from this information future medical procedures will be determined. Exposure to a high energy particle beam will make the victim's body radioactive, however, the radiation levels from the exposed person's body will not be high enough to pose a hazard to other personnel. The amount of induced radioactivity depends on the dose received and can therefore be used to estimate the dose.

The first person who becomes aware that a beam-on exposure may have occurred should **DIAL 3131** immediately. Do not attempt to enter the enclosure while the beam is still on. Remain on the scene to provide information to Emergency Response personnel and to prevent others from entering the enclosure until the beam is off. Identify those

persons who may have been exposed and prevent them from leaving the area.

The Emergency Operator, upon receiving a call to 3131 regarding a beam-on exposure is to issue a Code 5 (Incident Involving Radiation) and contact the MCR to ensure the beam has been turned off. In addition, the Emergency Operator is to contact ES&H Section personnel who are responsible for performing the dose assessment. If any of the persons are seriously injured, treatment of that injury should take priority over body counting measurements. The urgency of medical treatment shall be decided by the Incident Commander or Fire Protection personnel.

All exposed persons not seriously injured should be taken by the Fire Department to the whole body counting facility at Site 39. The Fire Department will begin the counting procedures. A security guard may accompany them to aid in crowd control and communication.

The following actions shall be taken by the MCR Crew Chief in the event of a suspected beam-on exposure in Accelerator Division enclosures.

a. Immediately turn off particle beam in all areas by using the Master Beam Switch. Then disable Linac Critical Devices. Ensure that the particle beam cannot be turned back on until permission has been obtained from the Laboratory Director.

b. Do not yet turn off the beam transport elements unless it is necessary to make the area safe.

c. Do not yet attempt any repair activities or "open the area up" to investigate.

d. Answer as many of the following questions as you can. Record the information in the MCR Crew Chief's logbook when possible. Put together a package of information to be reviewed by the investigation team.

   i. Date and your name.

   ii. Name(s) of exposed person(s) and others who may have relevant information.

   iii. Location of accident (area, beam line, enclosure, location in enclosure).

   iv. Times at beginning and end of exposure.

   v. Accelerator (beamline) performance during this period (e.g., down times, missed pulses, irregular performance).

   vi. Beam transport settings (hard copy if possible).

   vii. Beam energy, intensity, size.

   viii. Loss monitor readings and/or area radiation detector readings during the time of the exposure.

   ix. Description of the incident to the best available knowledge, including what failure(s) of equipment and/or procedures may have led to the exposure, or any other pertinent information.

e. Call appropriate personnel on Accelerator Emergency Call List, http://www-bdnew.fnal.gov/esh/ad/emergency_warden_list.htm.

f. After permission is received from the Accelerator Division Head or his designee, make a radiation survey (beam-off) map of the area where the exposure occurred. Record the time that the survey was made. (This step may be performed by the AD Radiation Safety Officer (RSO) or Radiation Control Technicians, if available.)

5.1.5 EXPLOSIONS

In the event of an explosion in Accelerator Division areas, the MCR Crew Chief will report to the Incident Commander at the scene to assist Emergency Response personnel with the emergency. If there is any further danger of explosion, personnel will be evacuated by the nearest safe exit.

5.1.6 PERSONNEL INJURY

NOTE: The primary concern in the case of personnel injury is to provide necessary medical care for the injured person(s). In any credible event within AD, radiation and contamination levels are not sufficiently high to present a life-threatening hazard once the beam has been turned off. Therefore, lifesaving efforts should take precedence over radiological concerns.

When an injury occurs, the following should be carried out:

a. The person who first becomes aware of the injured shall immediately **DIAL 3131** to get help from the Fire Department and relate all pertinent information.

b. If requested by Emergency Response personnel, the MCR Crew Chief shall dispatch operators to the scene and render any assistance necessary. The Crew Chief shall nominally remain in the Main Control Room to assist in coordination of activities unless his/her presence is requested at the scene.

c. If the injured is in a Radiation Area or High or Very High Radiation Area, he/she may be moved to an area of lower radiation levels if they can move themselves or can be moved by others without any risk of further injury.

d. If the injured is in a Contamination Area which is not a Radiation Area or High or Very High Radiation Area, he/she should be kept from moving so as to avoid the spread of contamination.

5.1.7 TORNADO AND NATIONAL ALERTS

5.1.7.1 Tornado Watch

Notification of Tornado Watches affecting the Fermilab site will be broadcast over the following components of the Site Wide Emergency Warning System (SEWS): all radio frequencies (including the 113 paging system), Emergency Alert Receivers (EARs), and Safety Alert Monitor (SAM) units. Sirens will not be activated.

No action is required by Accelerator Division personnel (other than resetting activated EAR and SAM units), but personnel should be alert to changing weather conditions and be prepared to take shelter should a Tornado Warning be sounded.

5.1.7.2 Tornado Warning and National Alerts

Notification of Tornado Warnings affecting the Fermilab site will be broadcast over all components of the Site Wide Emergency Warning System (SEWS): outdoor sirens, all radio frequencies (including the 113 paging system), Emergency Alert Receivers (EARs), and Safety Alert Monitor (SAM) units. Upon receiving notification of a Warning via SEWS, MCR operators will activate AD's internal Tornado Warning System which initiates an "intermittent Klaxon" alarm and voice intercom announcement in accelerator enclosures and the footprint areas. Personnel are to proceed to shelter areas. The list of shelters for AD areas can be found at http://www-bdnew.fnal.gov/esh/bldg/shelter_locations.pdf.

NOTE: The Master Beam Switch shall be turned off in the Main Control Room by the MCR Crew Chief prior to his/her taking shelter.

5.1.8 TOXIC MATERIAL RELEASE OR EXPOSURE

5.1.8.1 Release in Underground Beamline Enclosures and Connecting Corridors

In the event of significant air contamination caused by dust, fumes, vapors, or other agents, the affected enclosure(s) should be evacuated immediately via the nearest exit and assistance of the Fire Department (for investigating and containing the release and searching for missing personnel) should be requested by **DIALING 3131**. In addition, the Main Control Room should be notified so that the MCR operators can utilize the paging system to direct personnel in the affected enclosure(s) to evacuate. The MCR Crew Chief should dispatch operators to meet Fire Department personnel at the Incident Command Post at the scene, avoiding any area affected by the release.

Individuals suffering from the effects of the contaminants should be reported to the Emergency Operator by **DIALING 3131** and treated as personnel injuries.

5.1.8.2 Release in Above Ground Shops and Labs

In the event of significant air contamination caused by dust, fumes, vapors, or other agents, the affected building(s) should be evacuated immediately via the nearest exit and assistance of the Fire Department (for investigating and containing the release and searching for missing personnel) should be requested by **DIALING 3131**. The MCR Crew Chief should dispatch operators to meet Fire Department personnel at the Incident Command Post at the scene, avoiding any area affected by the release.

Persons overcome by toxic agents should be treated for personnel injuries. **DIAL 3131.**

5.1.8.3 External Release Threatening a Building or Enclosure

In the event that a toxic (or otherwise hazardous) material release (e.g., a flammable gas plume) poses a threat to personnel in and around AD buildings and areas, personnel becoming aware of the threat should seek shelter indoors or otherwise out of the path of the released material, notify the Emergency Response Organization of the threat by **DIALING 3131**, and notify the MCR so that operations personnel can use the paging system, if possible, or other means of notification to instruct personnel to remain indoors at the affected buildings or enclosures. MCR personnel, Emergency Wardens, or building occupants should also attempt to shut down all building ventilation systems if it is possible to do so without being exposed to the toxic/hazardous material. The ventilation system shutoff locations for Accelerator Division areas are contained in Attachment 4. Further direction should be sought from the Laboratory Emergency Response Organization by the Accelerator Division personnel in charge of the local response (see Section 2.2 for chain of command) regarding possible building evacuation, long-term sheltering, or other protective actions. Instructions from the emergency dispatcher may be received via Safety Alert Monitors (SAMs), Emergency Alert Receivers (EARs) and/or emergency pagers.

5.1.9 CRYOGENIC EMERGENCIES

The basic initial response for personnel in the vicinity of a cryogenic release is to move away from the immediate area of the spill to a distance of approximately 20 or 30 feet as rapidly as possible regardless of protective equipment. Once personnel have gotten away from the immediate area of the release, they should implement the guidelines in Attachment 1 for response to uncontrolled releases of cryogens.

5.1.10 ENVIRONMENTAL/CHEMICAL SPILL

Refer to Attachment 2 for the Spill Control Plan.

5.1.11 THREATS

Anyone receiving a threat to life or property by telephone or by other means should immediately notify the Emergency Operator by **DIALING 3131** and conveying all available information. Further action will be based on instructions from the Incident Commander.

5.1.12 EMERGENCY SHUTDOWNS

Emergency shutdown of accelerator/beamline equipment does not constitute a personnel hazard.

5.2 RECORDS

It is the responsibility of the senior person in charge (see Section 2.2, Emergency Direction) to ensure that events are logged to be able to reconstruct the incident.

5.3 PERSONNEL ACCOUNTABILITY

It is the immediate responsibility of the Emergency Wardens to ensure, without endangering their own safety, that a hazardous area does not have injured personnel in it.

The Emergency Warden shall interview all personnel who were present at the scene of an emergency in an effort to determine the names or a description of missing personnel.

If there is an unaccounted person that could possibly be in the hazardous area, the local Senior Emergency Person (see Section 2.2, Emergency Direction) should be immediately notified. This should be done even if the slightest doubt exists.

6.0 RECOVERY AND REENTRY

Following an incident and subsequent emergency response, the Accelerator Division will evaluate the extent of any damage and subsequent actions to be taken to bring the area back into service. It shall be the responsibility of senior person in charge upon receipt of control from the Emergency Response Organization to ensure that the necessary environmental, industrial hygiene, industrial safety, radiation safety, and operational issues receive the proper review prior to starting recovery operation.

7.0 PUBLIC INFORMATION

All communication with outside agencies shall be coordinated through the Laboratory's Office of Communications.

8.0 EMERGENCY FACILITIES AND EQUIPMENT

8.1 EMERGENCY FACILITIES

The Accelerator Division has no designated "Emergency Facilities" within its areas of responsibility, but Division personnel do utilize the Main Control Room as a local center for coordinating activities during abnormal events, including emergencies affecting Accelerator Division areas.

8.2 EMERGENCY EQUIPMENT

Spill response resources located within the Division are identified in Attachment 2; there are no other Division materials designated as emergency equipment. However, within the Division are numerous pieces of safety monitoring equipment that could be utilized in emergency situations. The AD ES&H Department and/or the Operations Department know of the locations of the majority of that equipment.

9.0 TRAINING

All Fermilab personnel will be provided with basic emergency information as part of New Employee Orientation. Upon assignment to a Accelerator Division area, the employee's supervisor will provide basic information on local emergency preparedness matters, such as, location of shelters, alarms, and SEWS components.

Accelerator Division emergency training requirements for Emergency Wardens consists of an annual Emergency Plan Orientation class.

All of the training for the above individuals will be entered in the Laboratory's TRAIN database.

10.0 DRILLS AND EXERCISES

10.1 DRILLS

The scheduling, planning, and conduct of Division emergency drills are the responsibility of the Division Senior Safety Officer. At least one tornado drill and one other drill of the Division emergency plan are to be conducted each year for each occupied area.

Any drill intended to include participation by other divisions/sections, the Fire Department, Security, the Comm. Center, or any other response organization must be coordinated through the Laboratory Emergency Planner prior to implementation of the drill.

Actual events may be substituted for drills if the event initiated a sufficiently complete response in the judgment of the Division Senior Safety Officer.

Upon completion of a drill, a critique must be prepared and submitted to the Laboratory Emergency Planner. The critique should include "lessons learned" and any actions that are needed to remediate identified deficiencies that are within the scope of the Accelerator Division's authority to correct.

10.2 EXERCISES

An exercise is defined to be a scheduled and planned large-scale activity that tests the integrated capability of the Laboratory's emergency management program. Exercises are coordinated by the Laboratory Emergency Planner. The Accelerator Division participates in the development and execution of exercises to the extent requested by the Laboratory Emergency Planner.

11.0 EMERGENCY MANAGEMENT PROGRAM ADMINISTRATION

The Accelerator Division Emergency Plan (this document) is controlled as a Accelerator Division ES&H Procedure (ADSP) in accordance with Accelerator Division Administrative Procedure ADAP-01-0001. The Division Senior Safety Officer is responsible for preparation of the plan and the Division Head is responsible for its approval. The plan is to be reviewed and updated as needed at least once every 5 years.

12.0 DISTRIBUTION

Standard ADSP distribution.

ATTACHMENT 1

CRYOGENIC EMERGENCY RESPONSE PLAN

I. IN THE EVENT OF A RUPTURE OF A CRYOGENIC SYSTEM

A. Tunnel

Personnel at the Scene

1. While closely monitoring your oxygen monitor, evacuate from the first available exit without going through the problem area. **If your personal oxygen monitor alarms or you do not have one**, don your escape pack. If an escape pack is not available, and there are multiple nearby exits, exit from the second exit removed from the rupture area. Immediately after exiting into a safe area (out of the enclosure), remove your escape pack.

2. If the rupture was accompanied by an oxygen monitor alarm, **DIAL 3131** immediately upon exiting and report a **"Cryogenic Emergency"**. Report location of rupture and if personnel are injured or trapped in the tunnel. After calling 3131, call the Main Control Room (3721) and report the same information. Report names of personnel known to be in the area and confirmation of their being accounted for outside of the tunnel. If there was no oxygen monitor alarm, call the Main Control Room and report the rupture.

3. Remain at your location outside of the tunnel to ensure no-one enters (other than properly equipped emergency personnel). **No rescue attempts shall be made wearing escape packs.**

4. All personnel at the scene shall inform the Main Control Room (3721) of their location.

Main Control Room Personnel

1. Immediately after being notified of a Cryogenic Rupture:

   a. Closely monitor installed oxygen monitors and if the oxygen concentration starts decreasing order evacuation of that area/ sector. If the tunnel oxygen concentration decreases to less than 19.5% and there are personnel in the tunnel, **DIAL 3131** and report a **"Cryogenic Emergency"**. If the oxygen monitors in other areas of the tunnel start decreasing, order evacuation of the entire tunnel and all connecting tunnels.

   b. Notify Division Head and other appropriate personnel in http://www-bdnew.fnal.gov/esh/ad/emergency_warden_list.htm (Accelerator Division Emergency Personnel) and cryogenic experts.

2. Check the tunnel access list to verify personnel accountability. If any personnel who might be in the spill area are unaccounted for, notify the Senior Emergency Personnel at the scene.

3. The MCR Crew Chief will report to the scene and take charge until relieved by Senior Emergency Personnel (See Succession of Command in Section 2.2). The MCR Crew Chief shall take with him several personal Oxygen monitors available in the MCR.

4. No personnel access shall be made to the tunnel until it has been determined safe to do so unless personnel presumed to be in the area

are unaccounted for. All accesses following a cryogenic rupture will require personnel to wear SCBAs unless it can be determined that the oxygen levels are greater than 19.5%. SCBAs will be brought to the scene by the Fire Department. SCBAs will only be donned by personnel who have current training, fit testing, and medical approval. All personnel wearing SCBAs will be attended by Fire Department personnel at all times.

5. The MCR Crew Chief shall utilize any personnel available to control the situation and stop the spill. When the cryogenic experts report to the scene, they are to be used as **advisors** with the MCR Crew Chief remaining in charge unless relieved by higher authority. If the MCR Crew Chief is relieved, he/she shall remain at the scene as an advisor until the situation is under control.

6. Re-entry for normal access will require approval of the Accelerator Senior Safety Officer or the Division Head.

B. Refrigeration or Compressor Building

Personnel at the Scene

Immediately evacuate the building. One person shall guard the door to prevent unauthorized personnel access. The other person shall immediately call the MCR from the nearest phone other than in the affected building and report the rupture. If there are personnel trapped or injured, **DIAL 3131** first and report a **"Cryogenic Emergency".**

Main Control Room Personnel

Follow the same steps as for a tunnel rupture except that the building doors and/or roll-up doors should be opened to ventilate the area if personnel can do so without exposing themselves to hazards.

II. OXYGEN MONITOR ALARM

A. Installed Monitor

Personnel at the Scene

1. Continuously check your personal monitor and immediately evacuate the tunnel or building. If your personal monitor decreases to below 19.5%, activate and don your escape pack.

2. Immediately after exiting from the tunnel or building into a safe environment, remove your escape pack if donned.

3. If the oxygen monitor alarm was confirmed by a second monitor or there was visual/audio indication of a possible rupture, immediately **DIAL 3131** from the nearest "safe" phone and report a "Cryogenic Emergency". All further actions shall be as per the emergency procedures for a rupture.

4. If the oxygen monitor alarm was not confirmed by another monitor or other indication, immediately call the Main Control Room (3721) and inform them of the alarm and location.

5. No personnel shall re-enter the area except Main Control Room personnel or Emergency personnel until the cause of the alarm has been found and rectified.

Main Control Room Personnel

1. Upon learning of an oxygen monitor alarm, the Main Control Room Crew Chief shall dispatch two operators with a portable radio and each equipped with a personal oxygen monitor and escape pack unless alarm is in a secured, closed area (i.e., interlocked).

2. Tunnel Oxygen Monitor Alarm

   a. Prior to arriving at the entrance to the tunnel, utilize whatever means available to try to determine the validity of the alarm. The controls system could be utilized to determine the status of the cryo system. If there is any evidence of a leak or rupture, **DIAL 3131** (if not already called) and report a "Cryogenic Emergency". If the alarm appears to be false the two operators shall slowly advance into the enclosure while constantly monitoring their oxygen monitors. If the oxygen concentration decreases to 19.5% or below, they shall activate their escape packs and immediately exit. Upon exiting they shall **DIAL 3131** and initiate a "Cryogenic Emergency".

   b. If the alarming oxygen monitor is confirmed to be erroneously alarming, replace the appropriate oxygen sensor head and ensure that the monitor now reads properly. If the monitor continues to alarm, call Accelerator ES&H for instructions.

3. Building Oxygen Monitor Alarm

   a. Upon arriving at the building entrance, the two operators shall carefully open the door and not enter. They shall look and listen for anything unusual. If everything appears to be OK, one operator with personal oxygen monitor and escape pack may cautiously investigate. The other operator shall stay in the doorway with the portable radio and keep the individual investigating in sight.

   b. If the personal oxygen monitor carried by the investigating operator decreases to 19.5% or less, the operator shall immediately don the escape pack and evacuate unless the time to don the escape pack is longer than the time to exit. A "Cryogenic Emergency" shall be initiated by **DIALING 3131** by the fastest means possible. All further actions shall be per the steps listed for a rupture.

   c. If the alarming oxygen monitor is confirmed to be erroneously alarming, replace the appropriate oxygen sensor head and ensure that the monitor now reads properly. If the monitor continues to alarm, call Accelerator ES&H for instructions.

B. Personal Oxygen Monitor Alarm

Personnel at the Scene

If a personal oxygen monitor alarms the individual and his partner shall immediately proceed to evacuate by the first exit available. If the second person's monitor also alarms, they shall don escape packs if available. If after exiting from the tunnel or affected building and the oxygen monitor alarm clears, they shall **DIAL 3131** and report a "Cryogenic Emergency". All further actions shall be as per the Emergency Procedures for a rupture.

If the personal monitor continues to alarm outside the tunnel or affected building and there is no visual or audio indication of a leak or rupture, the individual and his/her partner shall report to the MCR for a new personal monitor before returning to work.

WARNING

The portable escape packs are not to be worn for investigation or rescue. They are to be used for escape purposes only.

III. TRANSFER LINE & DEWAR RUPTURES

A. If there is an indication of a transfer line or dewar rupture, the individual who observes it shall **DIAL 3131** and report a "Cryogenic Emergency" and location of the rupture. The person shall in addition call the MCR (3721) and inform them of the problem.

The MCR shall ensure that 3131 has been called and follow the same procedures as for a rupture.

ATTACHMENT 2

ACCELERATOR DIVISION SPILL CONTROL PLAN

I. INTRODUCTION

The Fermilab Spill Plan (FSP) outlines both general and specific procedures to be followed when responding to various "credible" spill events. It is the intent of this document to supplement the FSP by outlining specific procedures and pertinent information uniquely relating to spills of materials that could occur in Accelerator Division (AD) areas. This local plan provides additional guidance for personnel who may be responsible for additional spill response measures such as initial reporting, spill control, and remediation activities. This plan applies to radioactive materials (wet and dry), non-PCB oils, PCB oil, ethylene and propylene glycol, mercury, and the flammable metals, lithium and cesium.

II. MINIMUM SPILL REPORTING PROCEDURES

A. Report all spills of radioactive materials (wet or dry) via 3131.

B. Report all large chemical spills via 3131. Even small spills of extremely hazardous substances, e.g., flammable metals, should be reported via 3131.

C. Chemical spills that are small but require additional resources, e.g., spill absorbents & equipment, personnel, etc., outside of the immediate work area for proper containment, shall be reported to the AD Environmental Officer (EO) or alternate, or Senior Safety Officer (SSO). (See http://www-bdnew.fnal.gov/esh/ad/emergency_warden_list.htm.)

D. Any amount of chemical spilled outdoors or into surface waters, e.g., ditch, pond, storm sewers, etc. requires as a minimum immediate notification to the AD EO, alternate, or AD SSO.

E. Any burning spill source should immediately be reported via 3131. In addition, the area should be evacuated due to the toxicity of fumes that may be encountered.

III. RADIOACTIVE MATERIAL (WET AND DRY) SPILL PLAN

A. Reporting

1. Dial 3131 to report the emergency. The emergency operator will contact radiation safety personnel.

B. Precautions

1. Turn off the ventilation system to reduce the spread of airborne contamination.

2. If personnel are contaminated, follow steps in Section 5.1.3 of ADSP-02-0401.

C. Control

1. If possible without risking personnel contamination, stop and/or limit the spread of the spill

2 Establish a boundary outside the spill area with rope or other means to prevent tracking and personnel contamination. Allow no access or exit by unnecessary personnel.

D. Cleanup

All cleanup operations shall be conducted by or under the direction of radiation safety personnel.

IV. OIL SPILL PLAN (INCLUDING PCB)

Oil-filled equipment represents the largest potential spill source in AD. Commonly used oils (mineral and synthetic) include vacuum pump oils, Diala AX, R-Temp, compressor oils, lubricating and cutting oils, and PCB-containing dielectric fluids.

PCB oil is oil containing 50 ppm or greater PCBs or oil whose PCB concentration is unknown. PCB oil spills shall be distinguished from non-PCB spills because of (1) the higher physiological hazard PCB oils represent to personnel (particularly those involved in cleanup), (2) the environmental impact and publicity associated with PCB oils tends to be more significant, and (3) regulatory requirements for cleanup and reporting (and associated penalties for noncompliance).

All of the equipment in Accelerator Division that represented a potential for a large spill of PCB oil has been removed from the site. Small leaks are possible from old capacitors. All equipment containing PCB capacitors is labeled as such. The bulk of the Division's PCB inventory is now contained in the Linac quadrupole power supplies. Leaks of PCBs require immediate response. The primary considerations in handling a PCB oil spill are to prevent personnel contact with the spill and to minimize the area affected. Decontamination of areas containing PCBs is very difficult and requires special expertise.

In recognition of the potential for oil spillage in many AD areas, the following precautions have been taken to minimize the spread of contamination and/or ensure a speedy response. Known PCB-containing sources have been labeled. Drain valves of pulsed power transformers serving the Tevatron and Main Ring Remnant have been fitted with plastic bags and absorbent pads to contain any leakage. These transformers, as well as those serving the Main Injector, have been outfitted with secondary containment basins. Each of the compressor rooms has a 55-gallon container of oil dry. Absorbent socks surround the oil tanks in the kicker buildings and the Linac klystrons and charging units. Spill response kits are located at Linac south, A0, Booster Gallery East and F0 service building (MRRF). Floor drains (leading to both sanitary and surface waters) in major oil-containing areas have been sealed. A catastrophic failure of a pulsed power transformer would be immediately noticed by the main control room staff who would initiate an immediate investigation and response action.

A. Reporting

1. Refer to Section II of this attachment for minimum spill reporting procedures with the following additional requirements:

   a. Minor PCB oil leaks must be reported immediately to the AD EO, alternate or AD SSO.

   b. Reporting a minor oil leak from a transformer sample valve discovered during semiannual inspections may be deferred until submission of the inspection report if the oil is contained by the plastic bags affixed to the valves and has not been released to the environment.

B. Hazard Information

1. Oil and PCB oil can be irritating to the eyes, nose, and throat if mists or vapors are present

2. Oil and PCB oil can be readily absorbed through the skin.

NOTE Burning oil (especially PCB oil) may emit extremely toxic gases and/or particulates. Immediately evacuate the area in the event of a spill source fire. Entry into areas after such an accident has occurred must be approved by the AD Senior Safety Officer or his designee. Once it is determined that toxic vapors are no longer present, control and remediation efforts may proceed under the direction of the AD/ES&H Department. In the event of PCB involvement, specialized personal protective equipment (PPE) may be required for access until the affected area is decontaminated.

4. Consult the appropriate MSDS (available from AD/ES&H) for additional hazard information.

C. Precautions

1. Treat oil of unknown PCB concentration as if it contains PCBs.

2. Wear appropriate clothing such as Tyveks, shoe covers, and gloves (milled neoprene for PCB) to prevent skin contact with oil or PCB oil.

D. Control and Remediation

1. For confirmed non-PCB oil spills:

   a. Stop the spill or attempt to minimize its spread if it is possible to do so without becoming contaminated.

   b. Contain and clean up the spill. Recover, as much as practicable, any spilled product. Absorb remaining oil with sorbent pads, rags, or oil dry.

   c. All oil recovered and deemed not useable, shall be collected and disposed of as a "used oil." Absorbent rags, pads, or oil dry used to cleanup a spill and is greater than 1 ft^3, shall be collected and disposed of as a special waste. Small amounts of absorbed spill cleanup debris can be disposed of as regular trash via dumpster, provided that amount is equal to 1 ft^3 per dumpster and is preferably double bagged.

2. For PCB spills and oil spills of unknown PCB concentration:

   a. Any active leak shall be contained to prevent exposure to humans or the environment and inspected daily to verify containment of the leak until repaired.

   b. Isolate the spill area to prevent personnel from spreading contamination. In the case of a leak of a substantial amount of oil (several square feet of floor space) isolate the visible spill area plus 3 feet until it can be cleaned up.

   c. The spill will be cleaned up under the supervision of the AD/ES&H Department. Only trained personnel shall be involved in cleanup of large spills of PCBs.

   d. Spills on floors or sealed concrete surfaces should be absorbed with oil dry, oil absorbent pads, socks, booms, rags, or other sorbent materials. Milled neoprene gloves, shoe covers, and Tyveks should be worn, at minimum.

   e. Required spill cleanup levels depend on the PCB concentration and volume of material spilled, the surface onto which the oil spilled, restrictions placed on access to the spill area and other site-specific factors. Follow-up decontamination may include removal of blacktop, soil/gravel, etc. This will be determined with consultation from the AD/ES&H Department.

f. PCBs are strictly regulated for handling, storage, and waste disposal. All PCB spill cleanup debris and contaminated items will be disposed of as special waste. Temporary storage areas shall be labeled with the M_L, 6" x 6" label. Only non-leaking PCB items can be stored in this location unless the material is contained in a non-leaking PCB container that contains sufficient absorbent material to absorb liquid. PCB waste can be stored in your area for only 30 days from the date of removal from service.

g. Cleanup information must be maintained for a period of 5 years. See ADSP-08-0401 for information required.

V. ETHYLENE/PROPYLENE GLYCOL SPILL PLAN

The ethylene glycol systems in Accelerator Division contain a maximum of 50% ethylene glycol in water. Small (less than 55 gallon) ethylene glycol systems are located in A0, F0, and East Booster Gallery. These systems are located indoors and will not pose an environmental threat if spilled.

In the fixed target locations there are large LCW systems that contain 40/60 mixture of ethylene glycol. They are located in the following locations and are maintained by the Mechanical Department:

MS2 (3000 gallons)
MS4 (600 gallons)
Meson Detector Building LCW Cooling System (500 gallons)
Meson Detector Building Glycol System (150 gallons)
PS3 (2000 gallons)
NS2 (3000 gallons)

The Mechanical Department keeps drums of 40/60 mixture of ethylene glycol that are stored inside of secondary containment and are located behind the NS4 service building. The Cryogenic Department maintains four large (approximately 1200-gallon) glycol systems are located at the Central Helium Liquefier (CHL). These systems are used for cooling Worthington Compressors A, B, C, and D. Each system contains approximately 1200 gallons of a 50/50 mixture of propylene glycol. The coolant system piping runs from each of the compressors (located indoors) to the respective cooling tower and expansion tank (located outdoors). No secondary containment is provided outside, so there is the potential for glycol to spill to the ground or through a drain to the closest body of water, Bulrush Pond. CHL has no floor drains directly in this vicinity; therefore an indoor spill will only pose a hazard to cleanup personnel. The chiller room on the east side of the building and approximately 4' away, also has a propylene glycol system that holds approximately 460 gallons of propylene glycol. It has its own containment.

A drain is located under each of the cooling towers. It is highly unlikely that the entire contents of one system could empty into one of these drains for several reasons. The twelve inch drain is situated at least three feet from the nearest piping. The gravel yard would severely inhibit over-ground flow to the drain. Even if the entire system (approximately 600 gallons of propylene glycol) drained to the pond (which contains at least 3,042,500 gallons), the well mixed pond concentration of propylene glycol would only be 200 ppm. This concentration effects few aquatic species since published aquatic toxicity levels (for 96 percent survival) range from 100 to 1000 ppm.

There could be localized mortality around the outfall since complete mixing will take time. Since Bulrush Pond has no natural outfall, the contamination would not be spread to other bodies of water. Over time, indigenous pond microorganisms will break down the propylene glycol.

The possibility of pipe rupture due to natural causes is highly unlikely due to the low operating pressure and heavy wall (Schedule 40) piping. The most likely spill would be a result of loosened fittings due to equipment vibration. The compressors are equipped with vibration alarms. This type of spill would most likely occur inside the building where vibration is at a maximum.

CHL has implemented a local spill plan, ADDP-CH-1004, detailing response to glycol spills.

A. Reporting

For spill reporting information, refer to "Minimum Spill Reporting Procedures", Section II of this attachment.

B. Health Hazard Information

1. Ethylene glycol is poisonous. A single lethal oral dose for humans is about 3 to 4 ounces. Ethylene glycol is not toxic to microorganisms. They can utilize it as a food source.

2. Ethylene glycol can be absorbed through the skin and may cause intoxication similar to ethyl alcohol intoxication. Upon contact, it may also cause skin and eye irritation.

3. Ethylene glycol has a very low vapor pressure; consequently, toxic concentrations in air are not expected unless it is heated.

4. Propylene glycol has a low degree of toxicity relative to ethylene glycol; however, intentional misuse may still be harmful or fatal. Direct contact or exposure to vapors or mists may cause mild eye and skin irritation. Because of its low volatility, exposure to vapors at significant concentrations is unlikely. However, inhalation of vapors or mists produced under certain conditions of use may cause headache, drowsiness, dizziness, loss of coordination, and fatigue.

C. Precautions

1. Wear appropriate clothing such as Tyveks and rubber or PVC gloves to protect skin from exposure.

2. Consult a MSDS available from AD/ES&H for additional hazard information.

D. Control & Remediation

In an emergency spill situation (where resources, material or personnel, are not immediately available for proper containment), the discoverer should call 3131 for assistance.

If the spill has been determined to be of a non-emergency nature and resources are immediately available for proper containment, perform the following spill containment and cleanup activities:

1. Stop the spill, e.g., close system valves, shut down compressor and pumps.

2. Contain and limit the spread of spilled material with rags, universal absorbent pads, booms, or containment pans. The oil-only absorbents pads and socks will not be effective in absorbing an ethylene glycol & water mixture. The universal pads and socks that absorb all liquids must be used! Cover any drains that lead to surface waters.

3. If the spill occurs outdoors, absorb all free liquid, and contact the ES&H Department. The ES&H Department will determine whether hosing down the area to further dilute the ethylene glycol mixture would contribute to surface water contamination. Dilution may lessen the toxic effects on animal life and may facilitate microbial degradation.

4. Contact AD ES&H Department for additional assistance with cleanup and waste disposal instructions.

VI. MERCURY SPILL PLAN

Mercury has the potential to leak from switches, relays, Ignitron tubes, thermometers, barometers, etc. Cleanup of spilled mercury is extremely difficult due to droplet proliferation and shall be performed by trained personnel. The AD/ES&H Department has several mercury spill kits (including mercury vapor respirators and amalgam) for use in spilled mercury retrieval.

A. Reporting

1. All mercury spills should be reported to the AD/ES&H Department. The EPA reportable quantity of an environmental spill of mercury is 1 pound.

B. Hazard Information

1. Highly toxic by skin absorption and inhalation of vapor.

2. Mercury is corrosive to skin, eyes and mucous membranes.

C. Precautions

1. Keep people away from the spill and prevent the spread of the mercury.

2. Secure the area around the spill to prevent unnecessary tracking of the spilled mercury.

3. Cease activities in the area until the spill is completely cleaned up.

4. If mercury is spilled in a confined area, ventilate the area immediately.

D. Control & Remediation

1. Mercury pools tend to break up into many tiny droplets. In order to limit the spread of contamination and recapture the mercury, pool the mercury with paper or some other disposable item. Do not use a motor-driven vacuum cleaner to clean up the spill. Contact AD/ES&H personnel for guidance and disposal procedures.

2. PPE to wear: Rubber latex gloves, safety glasses, shoe covers, white Tyvek coveralls, and mercury vapor mask.

3. Two cleanup methods are described available:

a. A mercury hand pump can be obtained from the AD/ESH Department.

Push the droplets together to form a pool. Using the hand pump, vacuum up all visible mercury droplets.

b. Amalgamating powder is also available for efficient mercury spill cleanup. The powder turns liquid mercury into a solid, thus reducing its vapor pressure, and allows the mercury to be retrieved with a common magnet. Broadcast the powder evenly over the contaminated area, mist lightly with water. Scrub the area with a scouring pad. The amalgam mixture can be picked up using a magnet that is covered with a plastic bag.

4. When all droplets are removed, wipe the area, first with vinegar-soaked swabs followed by hydrogen peroxide-soaked swabs. A wipe sample of the area will most likely be required to determine the whether decontamination was effective.

5. Dispose of mercury-contaminated items in double-bagged polyethylene (ziplock bags) & label with a hazardous waste sticker. Disposal of retrieved mercury shall be arranged as soon as possible through the AD Waste Coordinator.

VII. LITHIUM/CESIUM SPILL PLAN

Lithium and cesium are grouped together because they have similar dangerous properties.

Lithium is used and stored in the AP0 building. The metal is used in the lenses that focus protons on the antiproton production target and antiprotons behind the target. There are unused quantities stored in the flammable cabinet (used only for lithium storage) on the south side

of the AP0 Target Hall (either packed in argon or oil). To reduce the hazard associated with handling lithium, all operations involving lithium are carried out in a glove box containing an argon atmosphere. In case of emergency, a lithium extinguisher is located by the south door to AP0.

Cesium is used in the ion source (located in the Pre-Accelerator Area) at the north end of Linac Gallery. A small quantity of cesium is stored in a flammable cabinet (used solely for cesium storage) in lower level Linac
(LIU-002). Work involving the use of this metal is also done under an argon atmosphere, though not in a glove box. A metal fire extinguisher is attached to the wall outside LIU-002.

A. Reporting

All flammable metal spills and fires should be reported via 3131.

B. Hazard Information

1. Lithium and cesium are dangerous fire and explosion risks. They react violently with water to give off corrosive dust and flammable, explosive hydrogen gas. Cesium may spontaneously ignite in humid air. Lithium will ignite spontaneously in humid air at elevated temperatures. Toxic fumes are generated when lithium and cesium burn.

2. Lithium, cesium and their hydroxides are extremely corrosive to eyes, skin, nose and throat.

C. Precautions

1. Normal fire extinguishers will not work on metal fires. Special chemical extinguishers are located in both work locations.

2. To prevent ignition, cover metals with mineral oil, and place in oiled steel drums, closing them securely and tightly.

3. Consult an MSDS available from AD/ES&H for additional hazard information.

D. Control and Remediation

Extinguishers for fighting metal fires may only be used by trained personnel. Other control/remediation activities associated with a spill/fire of lithium or cesium must also be performed by trained personnel.

ATTACHMENT 3

ANTIPROTON TARGET BUILDING (APØ)
EMERGENCY PLANS AND PROCEDURES

The APØ Target Station presents special problems because the nature of the high levels of radiation inherent in components that are bombarded by the primary 120-GeV proton bream from the accelerator.

Airborne Radiation Accident

In the event of an alarm by the continuous air monitor in the APØ building, the following steps should be taken:

a) Evacuate the APØ building. Record the names of personnel potentially exposed. Monitor all for external radiation contamination.

b) **DIAL 3131** to report an "airborne radiation emergency" from a "safe" location. (Phones also available in F23 and F2).

c) The crew chief shall inhibit the proton beam away from the Target Hall.

d) Radiation Safety personnel shall:

1) Check the control room for control system readout of the continuous air monitor in APØ (device D:ARM1 on any parameter page).

2) Obtain a 10 minute air sample from the port-hole located outside the roll-up door at APØ with a high volume air sampler.

Determine air concentration inside building from filter paper analysis.

3) Determine what protection measure shall be used to enter APØ by the following limits.

i) 10^{-8}µCi/ml to 10^{-6}µCi/ml - a full-face particle respirator shall be used.

ii) 10^{-6}µCi/ml to 10^{-5}µCi/ml - SCBA shall be used and personnel will be accompanied by the Fire Department.

iii) 10^{-5}µCi/ml or greater - Do not enter. Allow the air to settle/decay and take another air sample.

Note: Access to APØ shall be permitted only by the AD Radiation Safety Officer following an evacuation.

4) Once access is permitted into APØ, hook up the sample line from the tunnel to the AMS continuous air monitor, change filter paper recording time and flow rate, then take a 30-minute sample.

5) Take three 10-minute air samples with a high-volume sampler around the vault at the north end, the south end and in the center of shield wall.

6) Leave building and analyze all 4 samples.

e) Determine half life of activity.

1) If less than 30 minutes (short-lived and/or gaseous)

   i) Check for proper air flow in AP1 line.

   ii) Check that all penetrations for cabling and piping from APØ building into AP1 tunnel are sealed.

   iii) Ventilate the building. This may be accomplished by changing the air damper on the ventilation system to 100% outside air.

2) If greater than 30 minutes (long-lived particulates).

   i) Check for failure of target, Li lens, etc.

   ii) Check that all penetrations for cabling and piping from APØ building into AP1 tunnel are sealed.

   iii) Determine if any surface contamination problem exists and clean it up.

f) Once the source of the airborne problem is determined and rectified, operations may be resumed with permission of the AD Radiation Safety Officer.

g) Exposed personnel may be required to submit bioassay samples if it is determined by the RSO that sufficient evidence exists indicating that an uptake may have occurred.

ATTACHMENT 4

ACCELERATOR DIVISION AIR HANDLING SHUTOFF LOCATIONS

Cross Gallery and Footprint Areas

Item No.	Item Description	Area Location	Shut-off Information
1	HVAC	North Transfer Gallery Upstairs	TGN 210 Shutoff behind door.
2	HVAC	Center Transfer Gallery Upstairs and Downstairs	Upstairs TGC 223 right disconnect AC2. Downstairs TGC 125 right disconnect AC-1.
3	HVAC	Booster Tower East Upstairs and Downstairs	Upstairs BTE 217 disconnect #368. Downstairs BTE 104 disconnect #332.
4	HVAC	Booster Tower West Upstairs and Downstairs	Upstairs BTW 217 disconnect #383. Downstairs BTW 104 disconnect #382.
5	HVAC	Southeast Annex Upstairs	Two units on the mezzanine, disconnect by unit AC-1 and AC-2.
6	HVAC	Southwest Annex	Two shutoffs at the control units in SWA-101 by the Test Station. Open Johnson control box door, flip toggle switch in top right hand corner to off.
7	HVAC	Central Fan Room	Two units in XGC-110, shutoffs by each unit.
8	HVAC	North Linac Upstairs	LIN-201 disconnect left of door.
9	HVAC	Central Engineering Area	Unit on mezzanine above XGE-120, shutoff by unit.
10	HVAC	A0 Upstairs and Downstairs	A0 upstairs north end, disconnect by unit, in AOC-206 shutoff right of door.
11	HVAC	A0 Upstairs	A0 upstairs, 2 units at south end of A0S-200. Disconnects are by the units.
12	HVAC	A0 Downstairs	Switch on side of unit in A0C-101. Unit feeds laser room.

Cross Gallery and Footprint Area Porta-kamps

1	Window AC unit	BPW 101	East wall unit, local control
2	Window AC unit	BPW 103	North wall unit, local control
3	Window AC unit	BPW 105	North wall unit, local control
4	Window AC unit	BPW 107	North wall unit, local control
5	Window AC unit	BPW 109	North wall unit, local control
6	Window AC unit	BPW 111	North wall unit, local control
7	Window AC unit	BPW 117	North wall unit, local control
8	Window AC unit	BPW 117	North wall unit, local control
9	Window AC unit	BPW 119	North wall unit, local control
10	Window AC unit	BPW 104	South wall unit, local control
11	Window AC unit	BPW 106	South wall unit, local control
12	Window AC unit	BPW 108	South wall unit, local control

Cross Gallery and Footprint Area Porta-kamps Cont.

13	Window AC unit	BPW 110	South wall unit, local control
14	Window AC unit	BPW 112	South wall unit, local control
15	Window AC unit	BPW 114	South wall unit, local control
16	Window AC unit	BPW 116	South wall unit, local control
17	Window AC unit	BPW 118	South wall unit, local control
18	HVAC	F4 092	Shutoff on north end outside by unit.
19	HVAC	F4 174	Shutoff on north end outside by unit.
20	HVAC	PK 091	Shutoff on north end outside by unit.
21	HVAC	PK 122	Shutoff on north end outside by unit.

T049-50 (East of MP-8)

Item No.	Item Description	Area Location	Shut-off Information
1	Window AC unit	T049	T049 - South wall unit, local control
2	Window AC unit	T050	T050- North wall unit, local control
3	Window AC Unit	T049	T049 – West wall unit, local control
4	Window AC Unit	T050	T050 – West wall unit, local control

MS6 Service Building

Item No.	Item Description	Area Location	Shut-off Information
1	Exhaust Fan	Southwest	On/Off Switch Southwest PP-M6A-1 CKT 13
2	Exhaust Fan	Southwest	On/Off Switch Southwest PP-M6A-1 CKT 13
3	Exhaust Fan	Southwest	On/Off Switch Southwest PP-M6A-1 CKT 11
4	HVAC	Southwest	Local disconnect near unit fed from Southwest PHP-M6A-1 CKT 20,22,24

MW9-CT

Item No.	Item Description	Area Location	Shut-off Information
1	HVAC	Northeast	Local disconnect near unit fed from PHP-CH-1 CIR 26,28,30
2	HVAC	Southeast	Local disconnect near unit fed from PHP-CH-1 CIR 20,22,24
3	Exhaust Fan	Roof center	On/off switch by kitchen

NWA

Item No.	Item Description	Area Location	Shut-off Information
1	Window AC unit	T022	West wall unit, local control
2	Window AC unit	T027	West wall unit, local control
3	Window AC unit	T027	East wall unit, local control
4	HVAC	T028 east side	Air supply feeds T028 on the east face at the south end, Local disconnect outside near unit which is fed from PHP/NL/11 ckt.34
5	HVAC	T022 north side	Air supply feeds the north side of the south portakamp complex, Local disconnect near unit, thermostat located inside the portakamps, fed from PHP/NL/11 ckt. 46.
6	Window AC unit	T024	East face, north end, local control
7	Window AC unit	T025	South face, local control
8	Window AC unit	T024	South face, local control
9	Window AC unit	T025	West face, south end, local control
10	Window AC unit	T025	West face, north end, local control
11	HVAC	T069 north side	Local disconnect near unit, fed from PHP/NL/11B ckt. 34, thermostat inside portakamp.
12	UH-1 Gas heater exhaust	NWA north	North wall, blower control switch-north wall below heater unit, fed from PP/NL/11C ckts.15 and 17
13	Mechanical damper	NWA east	East wall, operational status - functional
14	Damper	NWA east	East wall, gravity operated with ductwork removed
15	RE-2 exhaust Fan	Roof south	South roof
16	RE-8 Exhaust Fan	Roof south center	South Center roof, Control is on the west wall just north of the restroom PP/NL/11 ckt. 7
17	RE-7 Exhaust Fan	Roof north center	North center roof
18	RE -1 Exhaust Fan	Roof north	North roof, control switch is located at the north end of the bldg., on the west wall above PP/NL/11B ckt. 2.
19	Exhaust Fan	Bathroom	Bathroom vent west wall, bathroom wall switch fed from PP/NL/11 ckt. 6.
20	Ductwork	NWA south	South wall
21	UH-2 Gas heater exhaust	NWA south	South wall, blower control switch is on the south wall of bldg. below the heater, fed from PP/NL/11A ckts. 39 and 41.