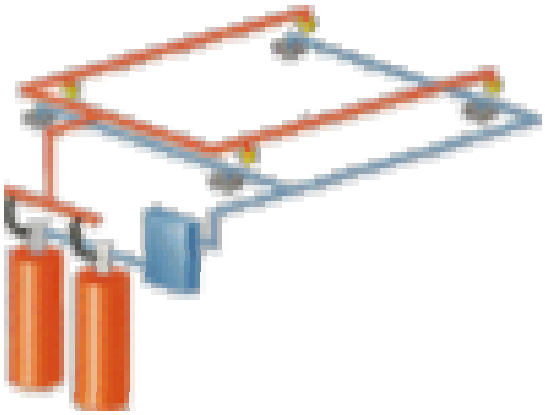
L18A Carbon Dioxide Fire Suppression Training



CA Department

BROOKHAVEN NATIONAL LABORATORY

Jan 2003

Originally Prepared by J. Levesque

I. REASON FOR THE COURSE

The L18A house is protected from severe fire damage by a carbon dioxide fire suppression system. Carbon dioxide is also called CO_2. Carbon dioxide can put out fires in high voltage electronics without ruining the electronics and causing an electrical shock. However, carbon dioxide systems are not without risk. Fatalities have occurred when workers were not trained on the hazards and proper precautions were not taken. In addition to following national safety standards for this system, BNL wants to take worker safety a step further. This training outlines those steps necessary to ensure worker safety with the L18A carbon dioxide system.

II. GOALS

Each trainee will understand:

- √ the hazards associated with the carbon dioxide system,
- √ the meanings of the alarms from the system and proper response for the employee,
- √ individual responsibilities and actions to ensure employee and coworker safety.

III. THE CARBON DIOXIDE SYSTEM

L18A contains pieces of accelerator equipment that are essential for the AGS Accelerator to operate. To help ensure that a fire does not cause the AGS to shutdown for long periods of time, a fire detection and suppression system has been installed in L18A. Due to the high voltage and sensitive electronic equipment, a carbon dioxide system was installed.

The building has smoke detection that sends alarms to the Fire/Rescue Group and rings local bells. This is all that the smoke detectors do. Smoke detection **does not** release the carbon dioxide.

Typical Smoke Detector,
NOTE vent holes for smoke to enter.

In addition to the smoke detectors, a separate set of heat detectors are installed to start the release of carbon dioxide. These heat detectors are not prone to false alarms like the smoke detectors. There is a far lower chance of releasing the carbon dioxide into the building with heat detectors. Heat detectors also require a larger fire to set them off.

Typical heat detector used to start the release of carbon dioxide.
NOTE the solid metal case.

When the heat detectors sense heat above 135 degrees F, a signal is sent to the fire alarm panel. The panel starts a discharge cycle, which goes like this:

- Fire Alarm Bells ring, if not already started by smoke detectors.
- Klaxon horns and strobe lights are activated (**this is the key difference in the warning**)
- After thirty seconds, the carbon dioxide is released in to the building. The room is unsuitable for human occupancy within 10 seconds, but it takes the carbon dioxide at least 30 seconds to completely discharge.

The building cannot be reentered until the space has been fully ventilated.

The building is also provided with fire alarm boxes. These are red boxes adjacent to the doors and are marked "Fire Alarm." They send a fire alarm signal to the Fire/Rescue Group. They do not start the discharge of the Carbon Dioxide system.

There is one Carbon Dioxide discharge station. It is a red box next to the fire alarm panel by the south door. It is marked "Carbon Dioxide Discharge." It will start the carbon dioxide discharge cycle.

The warning klaxons can be heard inside and outside of the building. Strobes are placed inside and outside.

Outside sign with klaxon and strobe to right.
These are located above the entrance doors.

To provide a positive means of preventing the accidental discharge of carbon dioxide into the building, an abort system has been installed. The switch is located outside the east entrance door of L18A.The switch is key operated to avoid unauthorized use. Activating the circuit causes a trouble alarm to be sent to the Fire/Rescue Group.

The abort switch is inside of a protective enclosure. The key operated switch is on the left side.

The Abort Switch prevents the detectors and manual discharge box from discharging the Carbon Dioxide. The only means to discharge the system when in abort is to turn the valves on top of the Carbon Dioxide tanks located in the shed outside L18A.

When in abort, the all of the fire alarm signals will still go to Fire/Rescue. The L18A fire alarm system has battery backup and will continue to function during power failures.

The facility is considered an ODH 0 Hazard due to the warning system and easy egress. It is posted with warning signs compliant with the National Fire Codes instead of BNL ODH warning signs.

IV. THE WORKER RESPONSIBILITY

Do not enter the building if the Klaxon and Strobes are activated. This indicates that the carbon dioxide has been released or will release very soon. Only allow Fire/Rescue to enter. This is considered an Oxygen Deficient Hazard area by virtue of the carbon dioxide hazard. Do not attempt a rescue unless equipped with SCBA.

If you are entering the building for **more than two minutes**, or you are doing work (not just a walk through or inspection), the carbon dioxide system should be aborted (turned off). To do this the L18A abort key should be used following the procedure below. Obtain a key from Art Piper in Room 129 of Bldg. 911. **The keys are uniquely numbered and require this training to be issued.**

V. Abort Procedure

1) Use the east door to enter the building. This door has the abort switch to the left side of the door.
2) Remove the protective cover to the switch by lifting the grab bar at the bottom and pulling toward you and upward. The cover should swing way.

3) Insert the L18A abort switch key into the switch on the left face of the device.

4) Twist the key clockwise, toward the "lock out" (abort) position.
5) The red light adjacent to the switch will light. If it does not, then contact Fire/Rescue and report a trouble with the abort. Do not enter until the system has been aborted.
6) After turning the key, the key may be removed. This prevents re-arming the system Replace the cover removed in step 2.
7) Enter the building and call Fire/Rescue X-2350 immediately.
8) Inform Fire/Rescue of your name, a way of re-contacting you (phone, pager), and the expected duration of the abort.
9) You will hear a trouble buzzer from the fire alarm panel located in the southwest section of the building. This is normal. The buzzer will stop when Fire/Rescue acknowledges receiving the alarm on the Site Fire Alarm System. Circuit 17 on the Fire Alarm Panel will be yellow to indicate that it has been aborted.
10) Proceed with work.
11) If the work continues past the expected restoration time, call Fire/rescue to update the time.
12) After the work is completed and the building is vacant, call Fire/Rescue (x-2350) and inform them of the impending abort restoration.
13) Exit the facility. The doors should be normally locked.
14) Lift the protective cover and reverse the procedure in step 4. The red light should go out.
15) Report any troubles with the abort system to Fire/Rescue.

It is the workers responsibility to protect themselves and fellow workers. Control of the keys are as important as aborting the system to perform work.