CONFINED SPACE ENTRY PROGRAM

Per
(29 CFR §1910.146)

Prepared for:

BOSTON COLLEGE
140 Commonwealth Avenue
Chestnut Hill, Massachusetts

Office of Environmental Health & Safety
Prepared: 1993
Revised: July, 2003
Revised: September, 2004
PM/EH&S
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1.0 INTRODUCTION

1.1 The Occupational Safety and Health Administration (OSHA) determined that entry into certain types of confined spaces poses a significant risk to workers. In order to protect workers from hazards encountered in these unique work environments, OSHA issued a Permit-Required Confined Space Standard (29 CFR §1910.146) on January 14, 1993.

1.2 The following program has been formulated to address confined space hazards in particular work settings, and procedures for safe entry. When scheduled maintenance or other procedures require personnel to enter a confined space, this program, in conjunction with other applicable Boston College safety and health programs, will enable employees to perform their work in a healthy and safe environment.

2.0 CONFINED SPACE DEFINITIONS

2.1 A Confined Space is defined as:

1. Large enough and so configured that an employee can bodily enter and perform assigned work;

2. Has limited or restricted means for entry or exit; and,

3. Is not designed for continuous employee occupancy.

2.2 A Permit-Required Confined Space is one that meets the above definition and has one or more of the following characteristics:

1. Contains or has potential to contain a hazardous atmosphere;

2. Contains a material that has the potential for engulfing an entrant;

3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or by a floor which slopes downward and tapers to a smaller cross section; or,

4. Contains any other recognized serious safety or health hazard.
2.3 An **Alternate Procedures Space** is a permit-required confined space in which the only hazard is atmospheric and where continuous forced air ventilation alone will maintain safe entry.
3.0 CONFINED SPACE IDENTIFICATION

3.1 The Boston College campus in Chestnut Hill and Newton contains areas which meet the definitions detailed in Section 2.0. These spaces have been identified and are inventoried in Appendix A of this document. The OSHA requirement for hazardous communication at entrances to confined spaces will be addressed through training and disciplinary procedures. All Boston College employees who may enter confined spaces, and alternative procedures confined spaces, have been informed of their location in training. Each employee is provided with a copy of the Boston College Confined Space Inventory during training. Employee training includes descriptions of the potential consequences - injury and illness up to and including death - of entering a confined space and not following required procedures.

3.2 All individuals who hire contractors who may enter these spaces and administer contracts with those contractors are responsible for informing contractors of the locations of these spaces and any known actual or potential hazards. When new spaces are created, a hazard evaluation is conducted, the space is classified, and, if appropriate, posted and added to the inventory. If conditions change within a confined space that previously was not considered permit-required confined space, the space is re-evaluated to determine its classification.

4.0 PROGRAM OVERSIGHT

4.1 This program is intended to provide requirements for safe work practices in these identified confined spaces. Compliance with this program is required for all Boston College employees and Contract Personnel. The Environmental Health and Safety Office along with Supervisors in the Facilities Management office and Network Services will be responsible for ensuring maintenance and service personnel comply with the requirements of this program. A thorough review of this program is conducted on an annual basis and modifications are incorporated as necessary. A copy of the OSHA 29 CFR 1910.146 Permit Required Confined Space Entry Standard is available at the EH&S office for review.

5.0 DEFINITIONS

Acute exposures - Exposures which occur for relatively short periods of time, generally minutes to 1-2 days. Concentrations of toxic air contaminants are high relative to their protection criteria. In addition to inhalation, airborne substances might directly contact the skin, or liquids and sludges may be splashed on the skin or into the eyes, leading to toxic effects.

Acceptable entry conditions - The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
Atmosphere - Refers to the air within a confined space. It should be clean, breathable air with enough oxygen for personnel to be able to enter the area, work and breathe.

Attendant - An individual stationed outside the permit-required confined space who is trained as required by this program and who monitors the authorized entrants inside the permit-required confined space and performs all attendant's duties assigned in the Boston College Confined Space Entry Program.

Authorized Entrant - An employee who is trained as required by this program and is authorized by Boston College to enter a permit-required confined space.

Blanking or blinding - Refers to the absolute closure of a pipe, line or duct by fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage behind the plate.

Ceiling Level - The maximum airborne concentration of a toxic agent to which an employee may be exposed for a specified period of time, usually 15 minutes. At no time must the exposure level exceed the ceiling concentration as listed in 29 CFR Part 1910 Sub Part Z.

Combustible Dust - A dust capable of undergoing combustion or burning when subjected to a source of ignition.

Confined Space - Refers to a space which by its construction or design, has limited openings for entry and exit, has poor natural ventilation, is a space which could contain or produce dangerous air contaminants and which is not intended for continuous employee occupancy. Confined spaces include, but are not limited to, storage tanks, process vessels, pits, vats, degreasers, reaction vessels, boilers, ventilation and exhaust ducts, sewers, tunnels, underground utility vaults and pipelines.

Contaminant - Any organic or inorganic substance, dust, fume, mist, vapor, or gas, the presence of which in air can be harmful to human beings.

Entry permit - A written or printed document that is provided by the employer to allow and control entry into a permit space and contains the information required under 29 CFR 1910.146, Permit-required confined spaces.

Entry supervisor - The person responsible for determining if acceptable entry conditions are present at a permit-required space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry.

Hazardous atmosphere - An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape from a permit space) injury, or acute illness due to physical or atmospheric and/or environmental conditions.
**Hot Work** - Any work involving burning, welding, riveting, or similar fire-producing operations, as well as work which produces a source of ignition such as drilling, abrasive blasting and space heating. Permits for **Hot Work** must be obtained in accordance with Boston College safety and health programs.

**Immediately Dangerous to Life or Health (IDLH)** - Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape unaided from a permit space.

**Inerting** - Displacement of the atmosphere by a non-reactive gas (such as Nitrogen) to such an extent that the resulting atmosphere is non-combustible. *Inerting an atmosphere produces an IDLH oxygen-deficient atmosphere.*

**Irritant** - Any substance that will induce a local inflammatory reaction on immediate, prolonged, or repeated contact with living tissue.

**Isolation** - A process whereby the confined space is removed from service and completely protected against the inadvertent release of material by the following: blanking off (skillet-type metal blank between flanges), misalignment of sections of all lines and pipes, a double block and bleed system, electrical lock-out of all sources of power, and blocking or disconnecting all mechanical linkages.

**Lower Explosive Limit (LEL)** - The minimum concentration of a combustible gas or vapor in air (usually expressed in percent by volume at sea level) which will ignite if an ignition source (sufficient ignition energy) is present.

**Oxygen Deficiency** - Refers to an atmosphere with a partial pressure of oxygen \( \text{PO}_2 \) less than 132 mm Hg. Normal air at sea level contains approximately 21% oxygen at a \( \text{PO}_2 \) of 160 mm Hg. At an altitude of 5,280 feet, normal air contains approximately 21% \( \text{O}_2 \) at a \( \text{PO}_2 \) of 132 mm Hg. *An oxygen-deficient atmosphere is one with less than 19.5% Oxygen.*

**Oxygen-Enriched Atmosphere** - Any oxygen concentration greater than 25% \( \text{PO}_2 - 190 \) mm Hg) at normal atmospheric pressure. *An oxygen-enriched atmosphere is one with greater than 23.5% Oxygen.*

**Permissible Exposure Limit (PEL)** - The maximum Eight-Hour, Time-Weighted Average of any airborne contaminant to which an employee may be exposed. At no time must the exposure level exceed the Ceiling concentration for that contaminant as listed in 29 CFR Part 1910 Subpart Z.

*For the purpose of this program, Boston College Permissible Exposure Limits are 50% of either the OSHA Permissible Exposure Limits or ACGIH Threshold Limit Values for a particular contaminant - the lower of the two.*
**Purging** - The method by which gases, vapors or other airborne impurities are displaced from a confined space. For example, an atmosphere may be purged of a hazardous airborne contaminant by forced ventilation - followed by atmospheric or environmental testing to ensure effectiveness.

**Qualified Person** - A person designated by the employer, in writing, as capable (by education and/or specialized training) of anticipating, recognizing and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person must be capable of specifying necessary control and/or protective action to ensure worker safety.

**Respirator (Approved)** - A device which has met the requirements of 30 CFR Part 11 and is designed to protect the wearer from inhalation of harmful atmospheres and has been approved by the Bureau of Mines and the National Institute for Occupational Safety and Health, and the Mine Safety and Health Administration (formerly Mining Enforcement and Safety Administration).

6.0 **CONFINED SPACE HAZARDS**

There are numerous hazards associated with confined spaces. These hazards can be divided into two (2) major categories - health hazards and physical hazards. The following details the kinds of hazards potentially present in identified confined spaces at Boston College.

6.1 **Health Hazards**

Hazardous atmospheres are a major concern when entering confined spaces. In order for entry to be safe, breathable air must be free from harmful chemicals and have more than 19.5% oxygen (outdoor air should have roughly 21%). If there is not enough oxygen present or if chemicals are present, a hazardous atmosphere may exist. Hazardous atmospheres that may be present within a confined space can be divided into four (4) categories: **flammable and explosive, toxic, irritating and/or corrosive and asphyxiating**.

1. **Flammable Atmospheres:**

   The following are examples of flammable atmospheres which could exist in a confined space. There are a number of reasons why the atmosphere in a confined space may become explosive or flammable. Boston College may not have all (or any) of the following types of explosive or flammable atmospheres within the facility's designated confined spaces. However, this information is supplied as reference for continued evaluation of these spaces.

   a. Confined spaces that contain chemicals which are explosive or volatile such as Gasoline or Diesel Fuel, have the potential for these chemicals to give off explosive vapors.
b. A confined space that has an oxygen level above 23.5% makes it an oxygen enriched atmosphere. In oxygen-enriched atmospheres, the potential for explosion increases when other explosive chemicals are present. This may be caused by chemical reactions involving an oxidizing agent. Oxidizers, by their nature, give off oxygen during chemical reactions.

c. Often when chemicals are stored in tanks, the walls will absorb some of the chemicals. After the tank has been emptied, the chemicals will permeate out of the walls in a process called desorption. This desorption may create sufficient vapors in the space to have an explosive atmosphere. Steel tanks, such as gasoline and propane tanks, will often display this desorption trait.

d. Solvents used to remove petroleum sludge in a tank are often explosive. The vapors given off by this product can lead to an explosive atmosphere if not controlled. It is important to ensure that the space is properly ventilated to avoid this problem.

e. When powdered chemicals or grains are loaded or unloaded, high quantities of dust may be generated. If the dust is combustible and uncontrolled, it may cause an explosion. It is essential to use proper loading/unloading measures to reduce the dust levels.

f. Some confined spaces may contain pyrophoric material that will ignite explosive vapor in the presence of air. Therefore, a qualified person should consider the potential for the presence of pyrophorics prior to ventilation.

Potentially explosive atmospheres must be carefully monitored with intrinsically safe instruments. Such instruments do not introduce an ignition source and will not cause an explosion in explosive atmospheres. Before any work is conducted in a confined space, the area must be ventilated. Ventilation must be constant throughout the work process. It is important to provide enough ventilation to work in the space safely and to prevent the outside area from accumulating explosive vapors.

In addition, all ignition sources must be eliminated prior to and during work in these types of atmospheres. Bonding and grounding should be used to eliminate static electricity. All electrical equipment must be grounded to prevent sparking and arcing. Extra care must be used if hot work is to occur in the confined space. Only properly trained and experienced personnel will be allowed to perform hot work in confined spaces.

2. Toxic Atmospheres

Toxic atmospheres may be produced by products that are solids, liquids or gases. These chemicals, in addition to the chemicals found on soiled rags and clothing, may cause toxic atmospheres to develop in enclosed spaces. Circumstances which may produce a toxic atmosphere are:
a. The product stored in the container is a toxic material.

b. Organic materials such as sewage give off Hydrogen sulfide when they decompose. Hydrogen sulfide (H₂S) is a colorless gas with an odor of Sulfur. H₂S is highly toxic and small quantities can cause severe illness or death.

c. The removal of sludge from tanks is a common practice. Often the sludge is volatile. Volatile means that the product releases vapors readily. The actual process of cleaning out the sludge can cause an increase in volatile vapors in the confined space.

d. Welding or cutting processes give off metal fumes. These metal fumes may be toxic and can build up inside a confined space.

e. Chemicals used in confined spaces will often have their own hazardous characteristics. These characteristics are often magnified in a confined space. The use of these products for cleaning can result in a toxic atmosphere.

Care must be taken to fully identify the contents of a confined space. Additionally, the products to be used in the space must be identified to ensure that they can be safely used. Complete atmospheric testing must be completed prior to entry. Never rely on your sense of smell as the sole detection device of toxic atmospheres. Carbon monoxide, among other gases, is toxic, colorless, and odorless and will not be detected by the human senses.

3. Irritant (Corrosive) Atmosphere:

Irritants are classified into two groups - primary and secondary irritants. Material Safety Data Sheets of materials found at the Boston College facility should be consulted for irritating or corrosive effects prior to any entry.

a. Primary irritants cause violent surface-irritating effects on skin tissue and the respiratory tract without causing other bodily health effects (systemic toxic effects). Selection of proper personal protective equipment will prevent exposure to these products. Examples of primary irritants are Chlorine, Sulfuric acid, Hydrofluoric acid, Ozone, Ammonia, Sulfur dioxide and Nitrogen dioxide.

b. Secondary irritants cause systemic toxic effects as well as surface irritation. These products will cause long-term health effects if personal protective equipment and clothing is not worn. Examples of secondary irritants include Carbon tetrachloride, Benzene, Trichloroethane, Trichloroethylene, and Ethyl chloride.

Prolonged exposure to irritating atmospheres may cause damage to the respiratory system and other vital organs. Proper selection and use of personal protective clothing will reduce exposure to these products.

4. Asphyxiating Atmosphere:
Oxygen constitutes approximately 21% of normal air. If oxygen levels drop below 19.5%, the atmosphere is considered to be oxygen-deficient or asphyxiating. In this environment, normal body functions begin to shut down. At an oxygen level of less than 16%, death will occur. The reduction of oxygen within a confined space may be the result of either consumption or displacement.

a. **Consumption** of oxygen may occur when welding, heating or cutting procedures take place in a confined space. Bacterial action in the decomposition or fermentation of organic matter and the rusting of metal will consume all oxygen present. The breathing process of workers within the confined space may also deplete the oxygen supply. *The more people working within a confined space, the faster the oxygen is consumed.*

b. **Displacement** of oxygen by another gas in a confined space may be accomplished naturally or by physically feeding another gas into the space. Displacement of oxygen may take place naturally in sewers, storage bins, wells and tunnels. This displacement is caused by the presence of other gases like Hydrogen sulfide and Carbon monoxide.

Gases such as Nitrogen, Argon and Helium are sometimes used as inerting gases. An inerting gas is used to displace a explosive atmosphere with a non-explosive atmosphere. Extreme care must be followed when using these "non-toxic", colorless and odorless gases. Gases with these properties are very dangerous asphyxiants and monitoring of the $O_2$ content of a confined space must be conducted continuously when they are in use.

### 6.2 Physical Dangers

The physical dangers within a confined space range from hazards associated with equipment within the space to physiological health hazards from heat and noise. The following section describes some of the hazards associated with working within a typical confined space. Boston College has a variety of confined spaces throughout the campus. Each has been evaluated for physical dangers unique to that space.

1. **Mechanical Hazards:**

Mechanical and electrical equipment are the cause of numerous injuries in confined spaces. All electrical and mechanical machinery must be disconnected and/or locked out from their power source. Piping must be blanked and/or disconnected and valves must be locked in the closed position. All pipes must be inspected for leakage before entry can be made (for example: inspecting pipes leading into the confined space, or using a flashlight to examine interior pipes from the outside). These procedures will prevent the entry of dangerous chemicals or vapors within the confined space while work is taking place. Properly locked-out and tagged-out machinery will prevent other personnel in the area from activating the electrical or mechanical process within the confined space. Follow the
procedures outlined in the Boston College Lockout/Tagout Program whenever equipment must be rendered inoperable.

2. **Communication Problems:**

Due to the configurations of many confined spaces, it is very difficult for the attendant to keep visual contact with workers inside. If communication is lost, the worker inside will not be able to notify the attendant of an injury. Communication must be maintained at all times. An alternate system must be established in the event that hand and arm signals or normal voice cannot be used. Intrinsically safe radios, alarms and rope signals can be used.

3. **Noise:**

Noise within a confined space makes communication difficult and increases the risk of hearing loss. Machinery outside of the confined space or activities inside the confined space, for example, sandblasting or jackhammering, will cause vibration and noise at high decibels. Hearing protection must be used to prevent permanent hearing loss. At the same time, a communication system must be maintained between the workers inside the space and the attendant.

4. **Thermal Stress:**

There are two types of thermal stress - hot and cold. Workers may be subjected to very warm temperatures within a confined space. This heat is caused by the use of personal protective clothing and/or the product and location of the space. Heat stress can be reduced by proper ventilation, frequent rest periods and drinking ample water.

Similar dangers exist in a cold environment. When the body temperature decreases, a worker is susceptible to frostbite and hypothermia. Frequent breaks to warm up and donning the proper clothing will help prevent cold stress.

At Boston College, during the cleaning process and ventilation of the confined space(s) with outside ambient air - care should be given to location of the intake so as to not introduce further contaminants (Carbon monoxide for example) into the atmosphere. In addition, due to weather conditions - air temperature in the work space(s) should be evaluated as determined in the most recent ACGIH Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

5. **Vibration:**

Work within a confined space that requires pneumatic tools, e.g., chippers or jackhammers, may cause vibration injuries to the hands and fingers. Specially designed gloves are to be worn to minimize the vibration to the hands and arms.

6. **Slips and Falls:**
Very often the interior of a confined space is not flat. There are sumps, baffles, scaffolding and surface residues or sludges which can lead to slips, trips or falls. Proper foot protection and careful movement in the space will help to prevent injury. During the cleaning, re-lining and inspection of tanks at Boston College, surfaces may be (or become) wet and slippery – often personal protective equipment such as boots/gloves or suits may increase slips, trips or falls.

7.0 PERSONAL PROTECTIVE EQUIPMENT/SAFETY AND RESCUE PROCEDURES

7.1 The selection of proper protective clothing is very important for work in confined spaces. Proper selection and use of protective clothing will help prevent injuries and illnesses. This selection process should bring together many factors - the type of work, chemicals involved, physical hazards, size of opening to the confined space, size of the workers and quality of the personal protective equipment itself.

The following discusses categories of personal protective equipment (PPE) that may be needed for confined space entry work. The Supervisor in charge of filling out the permit should consider all of the above factors to determine the most appropriate PPE for each confined space.

1. Eye Protection:

In confined space work, the eyes are exposed to a variety of hazards such as dust, flying objects, splashing of corrosive liquids, welding sparks and arcs and harmful radiation. OSHA requires that eye and face protection be designed to meet the performance requirements set forth in American National Standards Institute (ANSI) Z87.1, Practice for Occupational and Educational Eye and Face Protection. Eye protection should be chosen to protect the worker during specific job tasks. Welders should have protective hoods with tinted lenses to prevent arc burns. Splash goggles should be worn when the danger of splash exists.

2. Hearing Protection:

Working at noise levels above 85 decibels can cause hearing loss. Hearing protection must reduce the decibels down to safe levels. There are three (3) basic types of hearing protection:

a. Disposable, pliable material such as foam plugs.

b. Ear plugs which are specifically designed for the wearer.

c. Cup-type ear protectors that are worn with a band over the head, or are attached directly to a hard hat.

Contractor personnel must provide their employees with appropriate hearing protection devices in accordance with their Program. Levels of noise should be evaluated at commencement of activities.
3. **Body Protection:**

Protective clothing must be selected to provide both chemical protection and physical hazard protection. Suits must be selected using compatibility charts to ensure adequate chemical protection. Durability and dexterity must also be considered to ensure that the worker can perform the job task safely. The Department Supervisor will review environmental conditions and determine the appropriate level of protective equipment and clothing. Attendants and other personnel indirectly involved with the confined space entry (not directly involved with entry operations) must also wear personal protective equipment such as boots, long sleeved shirts, work pants, eyewear, hard hats, etc.

**Note:** Protective clothing and equipment may be more susceptible to flame, sparks or heat and its use in potentially explosive or explosive atmospheres should be evaluated thoroughly. During welding activities, caution should be exercised to prevent bodily harm. Boots worn beneath protective clothing must meet minimum ANSI guidelines.

4. **Respiratory Protection:**

**NOTE:** Boston College personnel cannot enter a confined space that requires respiratory protection or contains a hazardous condition as determined by testing without compliance with 29 CFR 1910.134 (Respiratory Protection).

Personnel donning any form of respiratory protection (negative-pressure, air-purifying or positive-pressure, air-supplied) must be deemed medically and physically fit and capable of wearing respiratory protection.

The level of respiratory protection must be based on levels of contaminants such as, but not limited to, VOCs and oxygen levels. In addition, the level of respiratory protection for inspection activities must also be evaluated prior to entry. To ensure that any mechanical ventilation of the space used is suitable, environmental conditions must be evaluated prior to entry to determine the appropriate level of respiratory protection.

Note: Filter-type (air-purifying) respirators are of no value in an oxygen-deficient atmosphere. National Institute for Occupational Safety and Health (NIOSH) approved self-contained oxygen or air-supplied respiratory equipment is required in oxygen-deficient atmospheres. Respiratory protection must be thoroughly evaluated and inspected for proper operating conditions prior to donning and tank/confined space entry. Negative-pressure respiratory protection is only utilized when and where appropriate as determined by environmental monitoring. Cartridges for use with negative-pressure, air-purifying respiratory protection are selected based upon the contaminant present in the space.

5. **Lifelines and Harness:**
There are three (3) types of lifeline/harness assemblies that can be used to assist with rescue/retrieval of injured employees. These include:

a. **Full-body harness** - This is the most preferable device to use. This system lifts from the center of the harness so the possibility of injury is minimized. Additionally, this device will help maintain the victim in an upright position. Activities involved with tank entry must be performed utilizing a full-body harness and lifelines. Means of retrieval must be performed utilizing mechanical systems attached to either a beam above the tank or the floor.

b. **Wristlets** - This device is used when the space has a narrow opening. The victim is lifted by the wrists so that the shoulders pass through the opening without getting stuck. This device is often used in combination with a full-body harness so that injuries to the arms, back and neck can be avoided.

c. **Safety belt with D rings** - This device is not the first choice. This device pulls from the waist and there is no control over the arms or legs. The victim is subject to back injuries when pulled while wearing this device.

   This device will not be available for use at Boston College. Contractors working at Boston College are prohibited from using this device.

Under the OSHA confined space standard, each person entering a hazardous atmosphere within a permit-required confined space must have a lifeline. This lifeline must be attached to a harness assembly which will allow the attendant to quickly remove entry personnel from the space. The attendant is also responsible for keeping the lines from tangling and keeping close communications with the entry personnel. Some type of retrieval device, such as a winch or tripod pulley, must be available to assist the attendant in lifting or pulling workers out of the space.

6. **Buddy System:**

   At Boston College, the buddy system is a standard safety practice that must be followed while working in a confined space. This does not necessarily mean there must be at least two people inside the confined space. If only one person is necessary, the entry person should consider the attendant as his/her buddy.

7. **Communication:**

   A system of communication between the entry personnel and the attendant must be established. Verbal and/or visual communication must be maintained at all times. A warning alarm signaling hazardous conditions must be implemented in order to let entry personnel know to leave the confined space immediately. A communication system must be established between the attendant and the contact for a rescue team.

8. **Rescue Procedures:**
The configuration of the confined space will dictate specific rescue procedures to be followed in case of an emergency. Boston College does not have an in-house rescue team, however, there are a few rules that should be followed in an emergency. During the safety meeting prior to commencement of the confined space entry, rescue procedures and locations of retrieval devices must be selected. The following are basic rescue procedures that should be followed in the event that a rescue from a confined space is necessary.

a. The attendant must not enter the confined space for the purpose of rescuing entry personnel.

b. The attendant will notify the employer that a rescue team is needed without leaving the work area.

c. The attendant will attempt to retrieve personnel with the safety equipment provided, such as, hoists or a block-and-tackle device for lifelines.

d. All rescue personnel will enter the confined space with SCBA. SCBA's may not be necessary if the injury is a broken bone or other physical injury, and the worker in the space is conscious.

Note: Under no circumstances are Boston College personnel to attempt a rescue by entering a confined space. Such procedures will be provided by outside services. Refer to Section 11.0 number 4 for additional information concerning outside rescue teams.

8.0 WORK PRACTICES AND TECHNIQUES

Before work can take place within a confined space, preliminary procedures must take place. The Department Supervisor in charge of filling out the Confined Space Permit must also provide for the following procedures:

8.1 Safety Meeting

All personnel involved with confined space entry work must have a safety meeting before work begins. All hazards must be reviewed and the measures used to control these hazards must be explained. This meeting should include any additional site-specific information and designated job duties such as:

1. Entry Team
2. Attendant
3. Decontamination Team (if necessary)
4. Supervisor
5. Health and Safety Officer (as applicable)
All personnel must sign off on the safety meeting section of the Confined Space Entry Permit stating that they understand all aspects of the above items, as well as all information stated on the permit.

8.2 **Isolation Procedures**

The confined space must be completely isolated from all other systems and equipment before entry is to be performed. Measures must be taken to prevent the entry of hazardous substances via pipe lines. The method used must prevent the entry of solid, liquids or vapors. There are three (3) common methods of isolation.

1. The first method involves the disconnecting and removal of pipe fittings closest to the confined space. The end of the pipeline is capped and misaligned, if possible. The pipe leading into the confined space should be drained and blanked (capped). Both procedures prevent product from coming in contact with workers inside and outside the space.

2. The second method of isolation involves inserting a full-pressure blank between flanges leading to the confined space. Again, the piping from the blanked flange to the space must be drained.

3. The third method of disconnecting is Lockout/Tagout. Stored energy, whether it be in electrical or mechanical form, can be very dangerous within a confined space. Some spaces move as a whole and some having moving parts within them. Lockout procedures must be in effect if work is to be done in this type of space.

**Note:** Any company or employee who performs servicing and maintenance of machines and equipment must comply with OSHA standard 29 CFR 1910.147, *The control of hazardous energy* (Lockout/Tagout). Any outside agency or contractor performing work within the Boston College facility must also comply with the Boston College Lockout/Tagout Program.

8.3 **Cleaning and Purging Techniques**

When isolation and Lockout/Tagout procedures have been completed, the confined space may require cleaning and purging. Many factors affect the efficiency of the cleaning process:

1. The contents of the confined space;
2. Decomposition products or chemical reactions that may change the atmosphere;
3. Scale or sludge that has built-up on the walls and floor;
4. The configuration of the space, such as baffles or sumps; or,
5. The size and location of manholes, doorways, vents.

Due to the variety of confined spaces at the Boston College, specific cleaning and purging techniques will be discussed during the meeting prior to commencement of activities.
Specific Standard Operating Procedures will be designed for each confined space at the facility.

8.4 Ventilation Techniques

There are basically two (2) ways to ventilate a confined space - natural ventilation and mechanical ventilation.

1. **Natural Ventilation** consists of opening doors, hatches, manways and side covers to allow the natural air currents to ventilate the confined space. The exchange of gases and vapors is unpredictable and the direction of these escaping vapors may cause hazardous atmospheres in the adjacent work areas. This method is not recommended as there may be limited access or incomplete distribution of air. However, if the sole atmospheric danger is a low oxygen content, natural ventilation may be effective. Proper oxygen monitoring must be performed to establish the effectiveness of natural ventilation.

2. **Mechanical Ventilation** is accomplished by directing a flow of air into the space by the use of a blower unit and hosing. All mechanical/electrical equipment used for ventilation should be grounded and, in the case of explosive or combustible atmospheres, should be explosion-proof (intrinsically safe). The following precautions are recommended:
   a. Exhausted air must be directed to an area where it can be dispersed without causing harm to other employees or work processes.
   b. The mechanical exhaust system should be kept in operation during the entire work period to ensure that the air in the space remains safe.
   c. Ventilation must maintain the lower explosive limit (LEL) below 10%, the oxygen above 19.5% and the contaminants below Permissible Exposure Limits (PEL). If the oxygen and other levels cannot be maintained, no entry must be made. If, at any time, during entry, the LELs rise higher than 10%, and/or the oxygen levels go below 19.5% or above 23.5%, and/or the PEL of any contaminant is reached, all entrants will leave the space immediately. At this time, a more effective ventilation method must be addressed.

8.5 Tools and Equipment

The type of tools to be used within the confined space will depend on the type of work which needs to be accomplished. Air-operated pneumatic tools are preferable over electrically driven tools because they are less likely to ignite a explosive atmosphere. When the use of portable electrical tools is unavoidable, they must be used with ground-fault circuit interrupters and be fully grounded. Temporary lights should be explosion-proof and have guards to prevent contact with bulbs.
Equipment must be suitable for use with the products in the space. For example, very acidic or alkaline solutions may oxidize and corrode metal tools. Material Safety Data Sheets should state what the chemical will react with.

9.0 PERMITTING AND TESTING FOR ENTRY INTO PERMIT-REQUIRED CONFINED SPACES

9.1 Permitting

Entry into a permit-required confined space is only performed once a permit has been completed. Appendix B contains the "Permit Form" which must be filled out and signed each time a permit-required confined space is entered by Boston College personnel. The permit is an authorized approval specifying the location of the confined space, the type of work to be done, and that a qualified person has evaluated the atmosphere and hazards.

Only the Department Supervisor can issue the permit. The permit reviews that the following items have been completed.

1. Location and description of the work to be done.
2. Hazards that may be encountered.
3. Isolation procedures have been accomplished including:
   a. Blanking and/or disconnecting of piping
   b. Electrical Lockout and Tagout
   c. Mechanical Lockout and Tagout
4. Clothing and equipment has been selected and is compatible with the hazardous atmospheres within the space. This selection should include consideration of the following types of equipment to used:
   a. Personal protective equipment
   b. Safety harness and lines
   c. Tools
   d. Approved electrical equipment
5. Atmospheric test readings have been taken including:
   a. Oxygen levels
   b. Flammability and/or explosive levels
   c. Toxic substance levels
6. Continuous monitoring while work is being performed.
7. All personnel involved with the work in the confined space have been properly trained. All personnel understand the hazards involved with the work.

8. Attendant(s) is specifically named on the permit.

9. Written Emergency Procedures and locations of First Aid and rescue equipment have been prepared.

10. Procedures to provide pedestrian, vehicle, or other barriers necessary to protect authorized entrants and to prevent unauthorized entry have been conducted.

The confined space permit must be dated and will be valid for one work shift only. Work that requires more than one shift to complete must receive an authorized permit for each shift. At completion of work, the permit must be voided.

The permit must be posted close to the entrance in plain view and a copy must be filed with the Department Supervisor. In addition as stated previously in this document, the space must be posted with a sign indicating that it is a permit-required confined space and only authorized employees are allowed to enter.

9.2 Testing

Confined spaces which have been identified to have the potential to contain an atmosphere that is immediately dangerous to life or health (IDLH) require that continuous monitoring of O₂ levels, explosive gas levels and toxic substances levels is performed. All tests must be conducted by a qualified person and recorded in a log. In addition, all instruments must be calibrated in accordance with the manufacturer's guidelines. Equipment used for continuous monitoring of gases and vapors must be direct reading instruments with audible alarms to warn of hazardous constituents or atmospheres.

When tests indicate the concentration of explosive gases is 10% or greater, no entry is permitted. Hot Work is only permitted in the confined space when levels do not exceed 8%. When tests indicate levels of toxic contaminants are above Permissible Exposure Limits (PELs), self-contained or air-supplied respiratory protection must be worn. When monitoring instruments indicate oxygen levels below 19.5%, positive-pressure, air-supplied respirators must be worn. Entry should not be made to a confined space with oxygen readings above 23.5%, and ventilation techniques should be used to reduce oxygen levels to approximately 21%.
10.0 ESTABLISHING AND TESTING PERMIT-REQUIRED CONFINED SPACES ENTERED BY ALTERNATE PROCEDURES

10.1 Establishing A Space For Alternate Procedures Entry

As stated in Section 2.3, an alternate procedures space is a permit-required confined space where:

1. The only hazard posed by the space is atmospheric; and
2. The use of continuous forced air ventilation alone maintains safe entry.

In order to establish data to support the above conditions, monitoring and inspection information must be collected. This information is maintained and kept on file in Department Offices and in the Environmental Health and Safety Manager's office. If the space must first be entered to collect supporting data, it must be done so in accordance with the requirements for entry into a permit-required confined space. Though once this information is collected, the space may be entered using abbreviated procedures as an alternate procedures space. Alternate procedures spaces do not require a permit be completed prior to entry, or specific rescue procedures to be in place.

10.2 Requirements For Entry Into Alternate Procedures Spaces

Prior to entry the Department Supervisor must certify that the space is safe to enter and that appropriate measures have been taken to eliminate the potential for a hazardous atmosphere to exist in the space. This certification must be written and include the date, the location of the space, and the signature of the Department Supervisor. This certification must be made available to each employee entering the space prior to entry.

Appendix B contains the Alternate Procedures Certification Form that must be completed prior to entry by Boston College personnel.

The following are requirements for entry into alternate procedures spaces:

1. Any conditions which make it unsafe to remove an entrance cover must be eliminated before the cover is removed.

2. When entrance covers are removed, the opening must be promptly guarded by a railing, temporary cover, or other temporary barrier to prevent an accidental fall through the opening and protect the employees working in the space from foreign objects entering the space.

3. Prior to any employees entering the space, the internal atmosphere must be tested with a calibrated direct-reading instrument for the following conditions, in order:

   a. Oxygen content;
   b. Flammable gases and vapors; and
   c. Potential toxic air contaminants
Note: There can not be any hazardous atmosphere within the space while employees are inside.

4. Continuous forced air ventilation must be used as follows:
   a. Employees must not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;
   b. The forced air ventilation must be directed so as to ventilate the immediate areas where employees are, or will be present within the space and must continue until all employees have left the space; and,
   c. The air supply for the forced air ventilation must be from a clean source and not increase the hazards in the space.

5. The atmosphere within the space must be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. If a hazardous atmosphere is detected during entry, the following must occur:
   a. Employees must leave the space immediately;
   b. The space must be evaluated to determine how the hazardous atmosphere developed; and,
   c. Measures must be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

11.0 CONFINED SPACE ENTRY JOB DUTIES

The following duties are segregated into four (4) job titles. Many of the duties described overlap, the purpose of which is to establish an educated, "safety-minded," confined space entry crew.

11.1 Authorized Entrants

Boston College ensures that authorized entrants have knowledge and a thorough understanding of:

1. Procedure and method for initiating emergency/rescue services.

2. Procedure for aborting entry.

3. Confined Space Entry Procedures (CSEP).

In addition, it is the authorized entrants responsibility to:

4. Know the hazards which may be faced during entry and determine acceptable quantified environmental conditions.
5. Recognize the signs and symptoms of exposure.

6. Understand the consequences of exposure to hazards.

7. Determine acceptable quantified environmental conditions.

8. Maintain contact with the attendant and understand the method(s) of communication.

9. Notify the attendant when initiating self-evacuation from the confined space.

10. Are familiar with the personal protective equipment necessary to make a safe entry and exit.

11. Understand the proper effective use and the limitations of monitoring equipment and know how to troubleshoot and calibrate the instrument.

12. Are provided with the appropriate personal protective equipment.

13. Use the personal protective equipment properly.

14. Are aware of the barriers necessary to protect entrants from external hazards and the proper use of those barriers, i.e., Lockout/Tagout.

15. Make sure proper signs are posted warning of hazardous areas.

16. Leave the confined space when ordered to do so by the attendant or when an automatic alarm is activated.

17. Leave the confined space when the entrants perceive that they are in danger.

### 11.2 Attendant

Boston College ensures that an attendant is stationed at, and remains immediately outside, the confined space(s) at all times during entry operations.

Attendants have knowledge and a thorough understanding of:

1. Procedure and method for initiating emergency/rescue services.

2. Procedure for aborting entry.


In addition, it is the attendants responsibility to

4. Continuously maintain an accurate count of all persons in the space.

5. Have knowledge of and the ability to recognize potential confined space hazards.
6. Monitor activities both inside and outside of the confined space to determine if conditions are safe for entrants to remain in that space.

7. Maintain effective and continuous contact with authorized entrants during entry.

8. Order authorized entrants to evacuate immediately if:
   a. The attendant observes a condition, or conditions, which is/are not allowed in the entry permit.
   b. The attendant detects behavioral effects of hazard exposure.
   c. The attendant detects a situation outside the confined space which could endanger the authorized entrant(s).
   d. The attendant detects an uncontrolled hazard within the confined space.
   e. The attendant must leave the work space or area.
   f. Summon rescue and other emergency services using available emergency phone numbers listed on the entry permit, as soon as the attendant determines that entrants need to escape from the confined space.
   g. Warn unauthorized persons away from the space.
   h. Request the unauthorized person(s) to exit immediately if they have entered the confined space.
   i. Inform the authorized entrants and the employer if unauthorized persons have entered the confined space.
   j. Properly use any rescue equipment provided and perform any assigned rescue and emergency duties without entering the confined space.
   k. Attendants **ARE NOT** to enter the confined space to attempt rescue of entrants.

11.3 **Department Supervisors and/or Personnel in Charge of Entry**

Boston College ensures that individuals who authorize entry into a confined space, or who are in charge of entry have knowledge and a thorough understanding of the:

1. Procedure and method for initiating emergency/rescue services.

2. Procedure for aborting entry.

3. Confined Space Entry Procedures (CSEP).
In addition, Department Supervisors and/or Personnel in Charge of Entry are responsible to:

4. Determine that the entry permit contains the requisite information before authorizing or allowing entry.

5. Determine that the necessary procedures, practices and equipment for safe entry are in effect before allowing entry.

6. Determine, at appropriate intervals, that entry operations remain consistent with the terms of the entry permit and that acceptable entry conditions are present.

7. Cancel the entry authorization and terminate entry whenever acceptable entry conditions are not present.

8. Take necessary measures for concluding an entry operation such as closing off a permit space and canceling the permit once all work authorized by the permit is completed.

9. Serve as authorized entrants or authorized attendants if properly trained to do so.

10. Take appropriate measures to remove unauthorized personnel who are in or near the confined space.

11. Department Supervisors and/or Personnel in Charge of Entry ARE NOT to enter confined space to attempt rescue of entrants.

11.4 Rescue Team

Boston College does not have an in-house rescue team, therefore, appropriate arrangements have been made for outside rescue services.

Outside Rescue Team Call Boston College Police Campus
Extension 2-4444 or outside line 617-552-4444

Boston College has provided rescuers (fire department personnel and medical response personnel) with information concerning the hazards they may confront when called upon to perform a rescue. Rescuers have been given the opportunity to access any and all confined spaces so the team can equip, train and conduct itself appropriately during a rescue. Rescuers are also given the opportunity to practice rescue operations from any and all confined spaces.

Should an outside contractor utilize outside sources to perform rescue operations, prior to entry into a confined space, this outside source must be informed of:
1. The schedule for confined space entry (or entries) shifts/hours of operation, start dates and expected completion dates; and,

2. The hazards which may be encountered during rescue operations.

3. It is the responsibility of the outside contractor to notify the outside rescue source that confined space entry or entries has been completed.

12.0 TRAINING

As the employer, Boston College must ensure that all authorized entrants, attendants, persons authorizing and/or in charge of entry and rescue personnel are thoroughly trained in the job duties listed in Section 11.0.

No Boston College personnel will act in any of the capacities outlined in Section 11.0 until deemed so qualified by the Department Supervisor in accordance with the Environmental Health and Safety Office.

Training is provided to all employees involved in confined space entry operations. The purpose of this training is to establish that such persons acquire the understanding, knowledge and skills outlined in this written program, as well as any additional information necessary for the safe performance of assigned duties. Training is provided:

- Before an employee first performs assigned duties that require entry into confined spaces;
- Before there is a change in assigned duties;
- Whenever there is a change in permit-required confined space operations that presents a hazard for which an employee has not previously been trained; and,
- Whenever there are deviations from the permit-required confined space entry procedures identified for a space, or there are inadequacies in the employee's knowledge or use of these procedures.

13.0 RECORDKEEPING

The Department Supervisor will keep on file for at least one year, copies of:

1. All entry permits;
2. Training of authorized entrants, attendants, supervisors, and;
3. Any documentation of non-compliance with permit and other health and safety issues in order to facilitate the review of the confined space program. Copies of all training documentation must be forwarded to the Environmental Health and Safety Office.

In addition, documentation of all environmental and atmospheric testing as applicable to the confined space entry permit system is also maintained as part of this program.
14.0 OUTSIDE CONTRACTORS

Whenever outside servicing personnel are to be engaged in activities covered by the scope and applications of this standard, the outside contractor must comply with the confined space entry requirements of outlined in OSHA's Permit-Required Confined Space Standard (29 CFR §1910.146). Contractors retained to perform work which requires confined space entry are also responsible to:

1. Obtain any available information regarding permit-required confined space hazards and entry operations from Boston College;

2. Coordinate entry operations with Boston College when both Boston College personnel and contractor personnel will be working in or near permit required confined spaces; and,

3. Inform Boston College of the confined space program the contractor will follow and any hazards confronted or created in the space through a debriefing or during entry operations.

In addition, whenever contractors perform work that involves entry into confined spaces, Boston College will provide contractors with a copy of this and any other applicable programs prior to performing any service as well as:

4. Inform the contractor that the workplace contains permit-required confined spaces and that entry is allowed only through compliance with a confined permit program;

5. Apprise the contractor of the elements, including Boston College's experience with the space that make it a permit-required confined space;

6. Apprise the contractor of any precautions or procedures that Boston College has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

7. Coordinate entry operations with the contractor when both Boston College personnel and contractor personnel will be working in or near permit-required confined spaces; and,

8. Debrief the contractor at the conclusion of the confined space entry operations regarding the confined space program followed and any hazards confronted or created during entry operations.
APPENDIX A

Inventory of Identified Confined Spaces

(See EH&S file copy for complete list of Permit Spaces and information)
APPENDIX B

Confined Space Entry Permit
And
Alternate Procedures Certification Form
BOSTON COLLEGE
Confined Space Entry Permit

Confined Space Building Location: ____________________________________________ Permit # ________________

Department: ___________________________ Supervisor: ____________________________________________

Confined Space Type: __________________ Purpose of Entry: ____________________________________________

Permit is valid from: __________________ to: __________________

Day                               Date                  Time (AM/PM)        Day                               Date                  Time (AM/PM)

HAZARDS TO BE ENCOUNTERED IN THE SPACE:

( ) Toxic: __________________________ ( ) Oxygen Deficiency: __________________________ ( ) Live Electrical Circuits: ____________

( ) Corrosive: _______________ ( ) High Heat Area: __________________________ ( ) Asbestos: __________________________

( ) Flammable: _______________ ( ) Drains/Sumps: __________________________ ( ) Welding & Cutting: __________________________

PERSONAL PROTECTIVE EQUIPMENT REQUIRED:

( ) Protective Coveralls: _______________ ( ) Boots: __________________________ ( ) Safety Shower/Eye Wash: _______________

( ) Rain Gear: __________________________ ( ) Face Shield: __________________________ ( ) Air Blower: __________________________

( ) Hard Hat: __________________________ ( ) Safety Glasses: __________________________ ( ) Ear Protection: __________________________

( ) Gloves: __________________________ ( ) Authorized Attendant: _______________ ( ) Escape Ladder: _______________

( ) Evacuation Plan: _______________ ( ) Communication: __________________________ ( ) Harness/Lifeline: _______________

( ) Emergency Rescue Services:

( ) Hospital: __________________________ ( ) Police Department: __________________________

FIRE SAFETY EQUIPMENT REQUIRED:

( ) Alarm Box in Area: __________________________ ( ) Fire Dept. Telephone: __________________________

( ) Equip. Grounded & Bonded: __________________________ ( ) ABC FIRE Extinguisher: __________________________

( ) Eliminate Ignition Sources: __________________________

EQUIPMENT TO BE ISOLATED

( ) Stop Transfers: __________________________ ( ) Post Work Signs: __________________________

( ) Disconnect and Blank: __________________________ ( ) Exclusion Area: __________________________

( ) Tag and Lockout: __________________________ ( ) Bleed Lines: __________________________

ELECTRICAL SAFETY REQUIRED:

( ) Lockout Circuits: __________________________ ( ) Pull Fuses: __________________________

( ) Non-Metal Ladder: __________________________ ( ) Equipment Grounded: __________________________
## AIR MONITORING RESULTS PRIOR TO ENTRY:

<table>
<thead>
<tr>
<th>Monitor Type: ________________________________</th>
<th>Serial Number: ____________________________</th>
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<tbody>
<tr>
<td>O₂ __________%</td>
<td>LEL __________%</td>
</tr>
<tr>
<td>Calibration Performed? Yes _______</td>
<td>No _______</td>
</tr>
<tr>
<td>Alarm Conditions? Yes _______</td>
<td>No _______</td>
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<tr>
<td>Monitoring Performed by (sign): ____________________________</td>
<td>Date: ____________</td>
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## CONTINUOUS AIR MONITORING RESULTS:

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<th>Time ______________</th>
<th>O₂ ______ %</th>
<th>LEL __________ %</th>
<th>CO ______ ppm</th>
<th>H₂S __________</th>
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## AUTHORIZATION:

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<th>Entrant’s Name</th>
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<table>
<thead>
<tr>
<th>Attendant’s Name</th>
<th>Signature</th>
<th>Date</th>
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<table>
<thead>
<tr>
<th>Supervisor’s Name</th>
<th>Signature</th>
<th>Date</th>
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</table>

Comments: _____________________________________________

________________________________________________________

( ) Ground Fault Interrupter: ________________________________

Page 1 of 2

BOSTON COLLEGE
Confined Space Entry Permit –continued
<table>
<thead>
<tr>
<th>Definitions</th>
<th>Acceptable Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>O = Oxygen</td>
<td>Above 19.5% &amp; Below 23.5%</td>
</tr>
<tr>
<td>LEL = Lower Explosion Limit</td>
<td>Less than 10%</td>
</tr>
<tr>
<td>CO = Carbon Dioxide</td>
<td>Less than 35ppm</td>
</tr>
<tr>
<td>H2S = Hydrogen Sulfide</td>
<td>Less than 20ppm</td>
</tr>
</tbody>
</table>
ALTERNATE PROCEDURE CONFINED SPACE
CERTIFICATION FORM

Boston College, Chestnut Hill, Massachusetts

Confined Space Location: ________________________________

Methods Taken to Eliminate the Potential for a Hazardous Atmosphere:

________________________________________________________________________

________________________________________________________________________

Due to the methods described above, I, ______________________________ certify that the confined space listed herein is safe for entry. To ensure the above identified space remains safe during entry operations the atmosphere within the space will be periodically tested to ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. If a hazardous atmosphere is detected during entry the following will occur:

- Entrants will leave the space immediately;
- The space will be evaluated to determine how the hazardous atmosphere developed; and
- Measures will be implemented to protect entrants from the hazardous atmosphere before any subsequent entry takes place.

______________________________
Department Supervisor Signature

______________________________
Printed

______________________________
Date

______________________________
Department
APPENDIX C

Rescue Services Agreement Form
APPENDIX C

Arrangements for Rescue from
Confined Spaces by Local Authorities

I, _____________________________, an authorized representative of Boston College, anticipate that _____________________________, will provide confined space rescue assistance to Boston College located at 140 Commonwealth Avenue, Chestnut Hill, Massachusetts, in an emergency situation.

A copy of the Confined Space Entry Program for The Boston College Campus has been provided to _____________________________, to aid _____________________________ during an emergency situation. In addition _____________________________ has been given access to all of Boston College’s confined spaces in order for the rescue team to train and equip itself to respond appropriately during a rescue.

____________________________________________  __________________________________
Authorized Representative of Boston College Signature       Title

____________________________________________  __________________________________
Authorized Representative of Rescue Services Signature       Title

____________________________________________
Date
APPENDIX D

Standard Operating Procedures Form
## BOSTON COLLEGE

**Confined Space Entry Standard Operating Procedures**

Confined Space/Building Location: ____________________________

Department/Company: ____________________________ Title: ____________________________

Date: ____________________________ Project Mgr./Supervisor: ____________________________

<table>
<thead>
<tr>
<th></th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Has the Boston College Confined Space Entry Program been reviewed? Is there a clear understanding of the scope of the applicable requirements in 29 CFR 1910.146 as they relate to your facilities?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Have Facility Managers &amp; Contractors reviewed the Confined Space Inventory for their buildings?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, is the space re-evaluated and reclassified as necessary? Are changes to the inventory forwarded to the EH&amp;S Department?</td>
<td></td>
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</tr>
<tr>
<td>4. Are the confined spaces in your facility/building posted with a danger sign to prevent unauthorized entry?</td>
<td></td>
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</tr>
<tr>
<td>5. Is work involving confined space entry assigned to authorized entrants and attendants who are properly trained and physically fit to do the work? Have duties been assigned to authorized entrants, attendants, entry supervisors and/or person(s) who test or monitor the atmosphere?</td>
<td></td>
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<tr>
<td>6. Are training records retained for all designated trained employees who perform confined space entries?</td>
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<tr>
<td>7. Is there a permit system in place for authorizing entries into permit-required confined spaces?</td>
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<tr>
<td>8. Are records of air monitoring activity kept on file? (i.e., calibration records, initial monitoring, continuous monitoring)</td>
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<tr>
<td>9. Are rescue procedures reviewed and implemented? Do entrants and attendants have operable means for contacting the operations center in the event of an emergency?</td>
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<tr>
<td>10. When contractors perform work that involves confined space entry, are they informed that the workplace contains permit spaces and that permit space is allowed only through compliance with a permit space program meeting the requirements of the OSHA standard?</td>
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### Types of Equipment Necessary for Entry:

<table>
<thead>
<tr>
<th>Equipment</th>
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<tbody>
<tr>
<td>Testing and monitoring equipment</td>
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<td></td>
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<tr>
<td>Ventilation equipment</td>
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<td></td>
</tr>
<tr>
<td>Communication equipment</td>
<td></td>
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<tr>
<td>Personal protective equipment</td>
<td></td>
<td></td>
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<tr>
<td>Barriers and shields</td>
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<tr>
<td>Equipment/Lighting for safe ingress and egress</td>
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</tbody>
</table>
APPENDIX E

OSHA Confined Space Decision Flowchart
BOSTON COLLEGE
Confined Space Entry Flow Chart

The following flow chart can be used to help determine the classification of a confined space at Boston College. If you have any questions regarding the determination of a confined space or in the assessment of specific hazards, contact the Department of Environmental Health and Safety at 617-552-0308.

Does the space meet all three of the following criteria?
1. Large enough to bodily enter and perform assigned work, and
2. Has limited or restricted means for entry or exit, and
3. Not meant for continuous human occupancy?

- NO
- YES

Confined Space (Requires Further Classification)

Does the space contain or have the potential to contain one or more of the following?
• Hazardous Atmosphere, or
• Engulfment Hazard, or
• Configuration Hazard, or
• Any other serious health hazard?

- NO
- YES

Permit-Required Confined Space (Completed Entry Form Required)

Does the space contain electrical power or distribution equipment?

- NO
- YES

Non-Permit Required Space

Alternate Procedures Space
APPENDIX F

Emergency Response Summary
Emergency Response Summary

Title: Confined Space Entry Program

Purpose: In order to protect workers from hazards encountered in confined spaces in accordance with OSHA Permit-Required Confined Space Standard (29 CFR §1910.146).

Scope: A Confined Space refers to a space which by its construction or design, has limited openings for entry and exit, has poor natural ventilation, is a space which could contain or produce dangerous air contaminants or a physical hazard and which is not intended for continuous employee occupancy. Hazardous atmospheres are a major concern when entering confined spaces. In order for entry to be safe, breathable air must be free from harmful chemicals and have between 19.5%-23% oxygen.

Contact Info:
Plan Administrator: Paul Matuszko (cell # 617-893-4476) 617-552-0303
Entry Contact List: EH&S Department 617-552-0308
BC Police 617-552-4444
Rescue Team: Newton Fire Department 911 or 617-796-2210
Boston Fire Department 911 or 617-343-3550
Emergency Care BC Health Services 617-552-3225
St. Elizabeth’s Hospital – emergency center 617-789-2666

Work Practices:
Boston College must ensure that all authorized entrants, attendants, persons authorizing and/or in charge of entry and rescue personnel are thoroughly trained in the job duties listed in the written program.

Before entering a confined space, the Department Supervisor shall notify the BC Police Dept. and is required to fill out a Confined Space Permit (attached) to document completion of atmospheric testing (prior to and constant), training, communication and emergency rescue procedures, etc. to be followed.

Workers entering a confined space shall be trained, have sufficient communication means and wear a lifeline harness to be utilized for emergency retrieval.

Monitoring Equipment: Boston College maintains two Neotronics 4-gas monitors for atmospheric testing prior to confined space entry. One unit is maintained in St. Clements’ Hall EH&S Office 215 and one unit maintained in the Ignacio Hall Trades Shop – Confined Space/Safety Closet.

Emergency Response Protocols:

Rescue Procedures: The configuration of the confined space will dictate specific rescue procedures to be followed in case of an emergency. Boston College does not have an in-house rescue team, however, the following rules must be followed in an emergency.

1. The attendant (outside personnel) must not enter the confined space for the purpose of rescuing entry personnel. Note: Under no circumstances are Boston College personnel to attempt a rescue by entering a confined space. Such procedures will be provided by outside services (fire department).
2. The attendant will notify BC Police and local fire department that a rescue team is needed without leaving the work area.

3. The attendant will attempt to retrieve personnel with the safety equipment provided, such as, hoists or a block-and-tackle device for lifelines.

4. All rescue personnel will enter the confined space with self contained breathing apparatus (SCBA). SCBAs may not be necessary if the injury is physical in nature, and the worker in the space is conscious.
APPENDIX G

Confined Space Entry Inventory Criteria
BOSTON COLLEGE

Confined Space Entry Inventory Criteria

Survey Criteria for Determining Confined Spaces:

A confined space has limited or restricted means of entry or exit, is large enough for an employee to enter and perform assigned work, and is not designed for continuous occupancy by the employee. These spaces may include, but are not limited to, underground vaults, tanks, storage bins, pits, diked areas, vessels and silos.

A permit required confined space is one that meets the above definition and has one or more of the following characteristics:

- Contains or has the potential to contain a hazardous atmosphere. Example: below grade vaults with sump pumps, sewerage pumps, etc., with only one entry way and no general room ventilation;

- Contains a material that has the potential for engulfing an entrant. Example: above ground storage tanks;

- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross-section. Example: above ground storage tanks;

- Contains any other recognized serious safety or health hazard. Example: single entry vaults containing electrical or mechanical equipment which do not have general room ventilation; or

Confined Space Entry Standards and Codes

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