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Confined Space
Permit Entry Program

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This Confined Space Permit & Non-Permit Entry program is written for Wesleyan University employees and outside contractors performing work in Wesleyan University Confined Spaces. All parts of this program need to be understood by the personnel who's job description may require them to supervise, attend or enter Wesleyan University Permit Required Confined Spaces

This program will establish procedures for entry into identified confined spaces, potential hazards within the specific confined spaces, provide hazard elimination and or control measures for safe entry and egress from Permit Required Confined Spaces and this Program will also provide notification to outside contractors of entry hazards and controls, ensure the safety of all employees and authorize entry through the permit process into confined spaces.

Section 1 Permit Required Confined Space Program

1.1 Introduction

It will be the responsibility of the Wesleyan University office of Environmental Health & Safety to oversee the implementation, training and evaluation of this program. This program will be reviewed annually to determine its effectiveness. Changes will be made to keep The Wesleyan University Permit Required Confined Space Program up to date and in compliance with 29CFR1910.146.

1.2 Responsibilities

Dept. of Environmental Health & Safety	Entry Supervisors
The EHS department will oversee the Confined Space Program, provide training for all participants, perform authorization of all Permits and notify all emergency personnel as outlined in this Program. The EHS department will conduct an annual review of this document and make changes as required by changes in 29CFR1910.146 and by the input of all participants in the Wesleyan University Permit Required Confined Space Program. It will be the responsibility of the EHS dept. to conduct or provide for all training requirements of this program and conduct periodic inspections of Confined Space Operations.	Entry supervisors are responsible for enforcing work practices necessary to assure continued employee safety. Responsible for checking the accuracy of the Permit and will have authority to cancel the permit and terminate the entry whenever they detect a condition not allowed by the permit, remove unauthorized individuals who enter a space or attempt to enter a confined space and have the responsibility to make entry checks again when taking over a shift. Entry supervisors will be required to review this document annually and request changes as needed.
Entry and Attendant Personnel	**Outside Contractors**
Training as required by 29CFR1910.146 Recognizing hazards in and around the space Knowledge on operation of specific safety equipment Annual Training on Confined Space Entry Permit Restrictions Contraindications and Precautions Monitoring of Permit Conditions PPE Assessment Atmosphere Assessment Annual Review of Program	Confined Space Program Awareness Hazard Communication of specific Confined Spaces Coordination with Facility Managers, Project Managers & EHS

1.3 Definitions

Acceptable Entry Conditions:	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.
Attendant:	Individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the Wesleyan University Confined Space Entry Program.
Authorized entrant:	Employee who is authorized by Wesleyan University to enter a permit space.
Blanking or Blinding:	Absolute closure of a pipe, line or duct by the 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 beyond the plate.
Confined Space:	1.) Is 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 (i.e., tanks, vessels, silos, storage bins, hoppers, vaults and pits). 3.) Is not designed for continuous employee occupancy.
Double Block and Bleed:	Closure of a line, duct or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.
EHS:	Wesleyan University's Dept of Environmental Health & Safety.
Emergency:	Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.
Engulfment:	Surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction or crushing.
Entry:	Action by which a person passes through an opening into a permit-required confined space. Including ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.
Entry Permit:	Written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in Wesleyan University's Confined Space Permit Program **Section 4.2.1 & Appendix E**.
Entry Supervisor:	Person responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations and for terminating entry as required by the Wesleyan University Confined Space Permit Program.

Hazardous Atmosphere: Atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (escape unaided from a permit space), injury or acute illness form one or more of the following causes:

1.) Flammable gas, vapor or mist in excess of 10 percent of its lower flammable limit (LFL)
2.) Airborne combustible dust at a concentration that meets or exceeds its LFL, (this concentration may be approximated as a condition in which the dust obscures vision a t a distance of 5 feet or less)
3.) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent.
4.) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in the *Occupational Health and Environmental Control* **29CFR1910.94-97** or in *Toxic and Hazardous Substances* **29CFR1910.1000-1450** which could result in employee exposure in excess of its dose or permissible exposure limit.
5.) Any other atmospheric condition that is immediately dangerous to life, health or the environment.

Hot Work Permit: Wesleyan University Hot Work Permit Program's written authorization to perform operations such as riveting, welding, cutting, burning and heating, capable of providing a source of ignition.

Immediately Dangerous to Life of 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 in a permit space by a noncombustible gas (such as Nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Isolation: Process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as:

1.) Blanking or Blinding
2.) Misaligning or removing section of lines, pipes or ducts
3.) Double block and bleed system
4.) Lockout or Tagout of all sources of hazardous energy
5.) Blocking or disconnecting all mechanical linkages

Line Breaking: Intentional opening of a pipe, line or duct that is or has been carrying flammable, corrosive or toxic material, an inert gas, or any fluid at a volume, pressure or temperature capable of causing injury.

Non-Permit Confined Space: Confined space that does not contain or with respect to atmospheric hazards have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen Deficient Atmosphere: Atmosphere containing less that 19.5 percent oxygen by volume.

Oxygen Enriched Atmosphere: Atmosphere containing more than 23.5 percent oxygen by volume.

Permit-Required Confined Space:	Confined Space that has one or more of the following characteristics: 1.) Contains or has a 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 4.) Contains any other recognized serious safety or health hazard
Permit System:	Wesleyan University's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.
Prohibited Condition:	Condition in a permit space that is not allowed by the permit during the period when entry is authorized.
Rescue Service:	Middletown Fire Department Confined Space Rescue Team
Retrieval System:	Equipment used for non-entry rescue of persons from permit space.
Testing:	Process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

Section 2.0 Hazard Identification

2.1 Acceptable Atmosphere Conditions

Acceptable conditions are:

- Oxygen content between 19.5% and 23.5% by volume
- Flammable gas, vapor or mist at or below 10% of is LEL/LFL
- Permissible concentration at or below the published level of any substance in **29CFR1910.94-97** & **29CFR1910.1000-1450**
- Atmosphere that is NOT IDLH (Immediately Dangerous to Life and Health).
- Un-obscured vision of at least five feet.

Any conditions outside of these criteria are to be considered Un-Acceptable, No Entry Allowed.

If atmosphere conditions are acceptable and the Supervising Attendant has notated the entry permit, then entry may continue.

2.2 Identification of Spaces

All spaces identified as Permit Required Confined Spaces are listed in **Appendix A** and are posted with signs as pictured below.

2.3 Specific Hazards by Space

2.3.1 Sewer, Electrical, Steam, Signal Manholes and Storm Drains:

Identifiable hazards include but are not limited to:

- Asphyxiation by lack of, or displacement of, oxygen or drowning in liquid
- Flammable and or Explosive Vapors
- Friable Asbestos (40CFR763.80)
- Slip Hazards (including ladders)
- Hot/Boiling Water
- Steam Leaks
- Exposures to live electrical wires, connections or transformers
- Hydraulic, pneumatic and/or mechanical systems
- Flooding from heavy rains, snow storms, ground water or leaking pipes
- Vertical entry operations
- Insects and other pests

Control of hazards will be accomplished by:

- ❑ Continuous Oxygen, Carbon Monoxide, Hydrogen Sulfide and Explosivity Monitoring
- ❑ Entrant to wear tripod safety harness and tripod being erected
- ❑ Visual inspection of manhole/drain for Friable Asbestos on pipe joints and insulation
- ❑ Empty space of all liquid
- ❑ Provide continuous positive ventilation
- ❑ Entrants must use UL approved Explosion Proof Flashlights or Auxiliary Lighting
- ❑ Stationed Attendant outside space at all times
- ❑ Tag out or Lock out all hazardous energy in accordance with Wesleyan University's Lockout/Tagout program
- ❑ Participate in Wesleyan University's Hot Work Permit Program if Applicable

Specific pre-entry briefing of all entrants to be conducted by the Supervising Attendant or Facility Manager with working knowledge of the systems and likely conditions of the equipment to be worked on.

Personal Protective Equipment Required:

- ❑ Normal Work Clothes
- ❑ Safety Glasses with Splash Guards
- ❑ OSHA/ANSI approved hearing protection when required **29CFR1910.95**
- ❑ Steel Toed Boots
- ❑ OSHA/ANSI Approved Hard Hat
- ❑ Tripod and Matching Body Harness
- ❑ Explosion Proof Flashlight

Special Procedures (pumping, purging, lighting etc.):

2.3.2 Air Handlers and Ventilation Ducts:

Identifiable hazards include but are not limited to:

- Asphyxiation by lack of, or displacement of, oxygen by Toxic Substances
- Flammable and or Explosive Vapors
- Exposures to live electrical wires, connections or transformers
- Hydraulic, pneumatic and/or mechanical systems
- Injury from moving parts
- Irritation from Dust Accumulation
- Slip Hazards

Control of hazards will be accomplished by:

- ❑ Continuous Oxygen and Flammable Limit Monitoring
- ❑ Use of Water Mist to Minimize Dust Exposure
- ❑ Stationed Attendant outside space at all times
- ❑ Verification that door interlocks are properly working
- ❑ Tag out or Lock out all hazardous energy in accordance with Wesleyan University's Lockout/Tagout program
- ❑ Participate in Wesleyan University's Hot Work Permit Program if Applicable

Specific pre-entry briefing of all entrants to be conducted by the Supervising Attendant or Facility Manager with working knowledge of the systems and likely conditions of the equipment to be worked on.

Personal Protective Equipment Required:

- ❑ Normal Work Clothes
- ❑ Safety Glasses
- ❑ OSHA/ANSI approved hearing protection when required **29CFR1910.95**
- ❑ Steel Toed Boots
- ❑ OSHA/ANSI Approved Hard Hat
- ❑ Dust Mask (voluntary use) **[See Appendix D 29CFR1910.134]**
- ❑ Explosion Proof Flashlight

Special Procedures (pumping, purging, lighting etc.):

2.3.3 Steam Inspection Chase (non-walkable)

Identifiable hazards include but are not limited to:

- Asphyxiation by lack of, or displacement of oxygen by Toxic Substances (Hydrogen Sulfide, Methane) or drowning in contents
- Friable Asbestos (40CFR763.80)
- Leaking Steam
- Flammable and or Explosive Vapors
- Slip Hazards

Control of hazards will be accomplished by:

- ❑ Continuous Oxygen and Flammable Limit and Toxic Substances Monitoring
- ❑ Visual inspection of Steam Chase for Friable Asbestos on pipe joints and insulation
- ❑ Stationed Attendant outside space at all times in constant radio contact with entrants
- ❑ Tagout or Lockout all hazardous energy in accordance with Wesleyan University's Lockout/Tagout program
- ❑ Participate in Wesleyan University's Hot Work Permit Program if Applicable

Specific pre-entry briefing of all entrants to be conducted by the Supervising Attendant or Facility Manager with working knowledge of the systems and likely conditions of the equipment to be worked on.

Personal Protective Equipment Required:

- ❑ Normal Work Clothes
- ❑ Safety Glasses with Splash Protection
- ❑ OSHA/ANSI approved hearing protection when required **29CFR1910.95**
- ❑ Steel Toed Boots
- ❑ OSHA/ANSI Approved Hard Hat
- ❑ Explosion Proof Flashlight

Special Procedures (pumping, purging, lighting etc.):

2.3.4 Crawl Spaces

Identifiable hazards include but are not limited to:

- Asphyxiation by lack of, or displacement of oxygen by Toxic or Flammable Substances (Hydrogen Sulfide, Natural Gas) or Drowning in contents
- Friable Asbestos (40CFR763.80)
- Exposures to live electrical wires, connections or transformers
- Flammable and or Explosive Vapors
- Insects and other pests

Control of hazards will be accomplished by:

- ❑ Continuous Oxygen and Flammable Limit and Toxic Substances Monitoring
- ❑ Visual inspection of Crawl Space for Friable Asbestos on pipe joints and insulation (40CFR763.80)
- ❑ Stationed Attendant outside space at all times
- ❑ Tagout or Lockout all hazardous energy in accordance with Wesleyan University's Lockout/Tagout program
- ❑ Participate in Wesleyan University's Hot Work Permit Program if Applicable

Specific pre-entry briefing of all entrants to be conducted by the Supervising Attendant or Facility Manager with working knowledge of the systems and likely conditions of the equipment to be worked on.

Personal Protective Equipment Required:

- ❑ Normal Work Clothes
- ❑ Safety Glasses with Splash Protection
- ❑ OSHA/ANSI approved hearing protection when required **29CFR1910.95**
- ❑ Steel Toed Boots
- ❑ OSHA/ANSI Approved Hard Hat
- ❑ Explosion Proof Flashlight

Special Procedures (pumping, purging, lighting etc.):

2.3.5 Excavations and Trenches

Identifiable hazards include but are not limited to:

- Asphyxiation by lack of, or displacement of, oxygen by Toxic Substances (Hydrogen Sulfide, Methane)
- Engulfment or Drowning in Contents

Control of hazards will be accomplished by:

- ❑ Continuous Oxygen and Flammable Limit and Toxic Substances Monitoring
- ❑ Stationed Attendant outside space at all times
- ❑ Tagout or Lockout all hazardous energy in accordance with Wesleyan University's Lockout/Tagout program
- ❑ Participate in Wesleyan University's Hot Work Permit Program if Applicable
- ❑ Participation in Wesleyan University's Trenching and Excavation Safety Program

Specific pre-entry briefing of all entrants to be conducted by the Supervising Attendant or Facility Manager with working knowledge of the systems and likely conditions of the equipment to be worked on.

Personal Protective Equipment Required:

- ❑ Normal Work Clothes
- ❑ Safety Glasses with Splash Protection
- ❑ OSHA/ANSI approved hearing protection when required **29CFR1910.95**
- ❑ Steel Toed Boots
- ❑ OSHA/ANSI Approved Hard Hat
- ❑ Explosion Proof Flashlight

Special Procedures (pumping, purging, lighting etc.):

2.3.6 Steam Inspection Tunnels (walk-able and adequately lit)

Identifiable hazards include but are not limited to:

- Asphyxiation by lack of, or displacement of, oxygen by Toxic Substances (Hydrogen Sulfide, Methane) or drowning in contents
- Friable Asbestos (40CFR763.80)
- Leaking Steam
- Flammable and or Explosive Vapors
- Slip Hazards
- Insects and other pests
- Exposures to live electrical wires, connections or transformers

Control of hazards will be accomplished by:

- ❑ Continuous Oxygen and Flammable Limit and Toxic Substances Monitoring
- ❑ Visual inspection of Steam Chase for Friable Asbestos on pipe joints and insulation
- ❑ Stationed Attendant outside space at all times in constant radio contact with entrants
- ❑ Tagout or Lockout all hazardous energy in accordance with Wesleyan University's Lockout/Tagout program
- ❑ Participate in Wesleyan University's Hot Work Permit Program if Applicable

Specific pre-entry briefing of all entrants to be conducted by the Supervising Attendant or Facility Manager with working knowledge of the systems and likely conditions of the equipment to be worked on.

Personal Protective Equipment Required:

- ❑ Normal Work Clothes
- ❑ Safety Glasses with Splash Protection
- ❑ OSHA/ANSI approved hearing protection when required **29CFR1910.95**
- ❑ Steel Toed Boots
- ❑ OSHA/ANSI Approved Hard Hat
- ❑ Explosion Proof Flashlight

Special Procedures (pumping, purging, lighting etc.):

Section 3.0 Equipment for Confined Space Permit Program

3.1 Atmosphere Monitoring

Wesleyan University uses a Biosystems Multivision® meter is used to monitor the air for oxygen content, explosive atmosphere, Carbon Monoxide, and Hydrogen Sulfide in confined spaces. The Biosystems Multivision® unit will only be used by trained personnel **(see Appendix B)** during confined space entry as described in Section 4.2.1 of this manual.

The Biosystems Multivision® meter is maintained by Wesleyan University's Department of Environmental Health, Safety & Sustainability and housed in the Cady Building at 170 Long Lane. The personnel listed in **Appendix B** ONLY conduct operation of the unit. Contact the Office of EHS&S for specific training protocols.

Maintenance and Calibration of the Biosystems Multivision® meter is conducted in accordance with the manufacturer's instructions and recommendations.

3.2 Safety Tripod and Harness

Wesleyan University uses a Tripod Retrieval System at all Manhole Confined Spaces that contained a hazardous atmosphere that was purged, ventilated or otherwise made safe to enter. All participants in the Wesleyan University Confined Space Program are required to be trained on this equipment.

The Tripod Retrieval System is maintained by Wesleyan University's Department of Environmental Health, Safety & Sustainability and housed at the Cady Building, 170 Long Lane.

Maintenance of the Tripod Retrieval System is conducted in accordance with the manufacturer's instructions and recommendations.

The Middletown Fire Department's Confined Space Rescue Team conducts ALL rescue Operations.

3.3 Personal Protective Equipment

3.3.1 Respirators

Wesleyan University Personnel must be trained in accordance with the Wesleyan University Respiratory Protection program and 29CFR1910.134 to enter spaces in which Half-Face or Full-Face Air Purifying respirators are required. See **Appendix C** for a list of employees trained to wear a respirator. **Wesleyan University does not allow employees to enter confined spaces that have oxygen levels that are NOT between 19.5% and 23.5% by volume, requiring the use of Self-Contained Breathing Apparatus (SCBA)**, outside contractors must have an active Respiratory Protection program that complies with 29CFR1910.134 to enter Wesleyan University Confined Spaces that require the use of SCBA's.

3.3.2 Normal Work Clothes

As defined by your Supervisor or Union Steward, coveralls or full-length pants must be worn to enter all Wesleyan University Permit and Non-Permit Required Confined Spaces.

3.3.3 Safety Glasses, Goggles and Shields

Must comply with OSHA/ANSI standards and be supplied to the employee at no charge, prescriptions lenses can be used if certified to be shatterproof. Side shields are required in situations where splash of a hazardous substance is possible.

3.3.4 Steel Toed Boots

Must comply with OSHA/ANSI standards.

3.3.5 Hard Hats

Must comply with OSHA/ANSI standards and must be worn in accordance with the manufacturer's instructions

3.3.6 Explosion Proof Flashlights

Must comply with OSHA/ANSI standards. Flashlights are included in the air monitoring kit and must be returned at the end of each permit operation.

3.3.7 Tyvek^{tm} Suits

Available from the Sciences Stockroom in Hall-Atwater Labs and are required in atmospheres that have the potential for contamination of Normal Work Clothes by substances listed as Toxic.

3.3.8 Gloves

Latex, Nitrile, Neoprene, Natural Rubber, Cotton or Leather should be worn in accordance with manufacturer's specifications and when the hazard assessment warrants it. Contact the Dept of EHS for questions or consult the Material Safety Data Sheet (MSDS) for the specific substance you will be exposed to.

3.3.9 Dust Mask Type N

Dust masks are available in the Sciences Stockroom in Hall-Atwater Labs for employees who want to voluntarily wear one in dusty atmospheres. **Appendix D of 29CFR1910.134 "Information for Employees Using Respirators When Not Required Under the Standard"** must be read and signed by the individual employee annually and the file must be maintained in the EHS office. **(See Appendix D)**

3.3.10 Specialty Personal Protective Equipment

Job or site-specific safety equipment will be evaluated at each specific site. Instruction on their use will be conducted prior to working with any new safety apparatus.

3.3.11 Communication Equipment

Physical Plants VHF radio network will be used in all cases requiring direct communication. If VHF radios are not acceptable or create a hazard, another communication system must be in place before entry into a confined space requiring direct and constant communication can commence. Visual or Auditory systems must be well rehearsed before continuing with entry.

3.3.12 Hearing Protection

Approved OSHA/ANSI hearing protection will be worn in atmospheres that have noise levels exceeding 85dBa for an eight hour shift or 115dBa for a fifteen minute exposure. See **29CFR1910.95** for the OSHA standard Table G-16.

Section 4.0 Training, Duties & Protocols For Confined Space Permit Program

Section 4.1 Training and Duties

4.1.1 Permit Authorizing Persons and Entry Supervisors

The Dept. of EHS&S will be the authorizing agent for all permits.

All Physical Plant Employees or their representatives, will be trained in all aspects of the Wesleyan University Confined Space Permit Program including entry, atmosphere monitoring, rescue equipment, rescue notification, hazard recognition and control, duties and responsibilities of entrants and attendants and the particulars of each specific Permit Required Confined Space.

The following checklist is required to be utilized to ensure accuracy of this program:

- ❑ Verify that the entry permit contains required information before authorizing or allowing entry.
- ❑ Verify that the necessary procedures and practices are followed and proper safety and maintenance equipment is available before entry.
- ❑ Ensure, at regular intervals, that entry operations remain consistent with the terms and conditions of the entry permit.
- ❑ Cancel the entry permit and terminate the entry whenever unacceptable conditions are present.
- ❑ Verify that the necessary measures to conclude the entry (space closed off, canceling of the permit, removing control of hazardous energy program) have been performed.
- ❑ Maintain record of entry in the Wesleyan University Permit Required Confined Space Program.

4.1.2 Confined Space Attendants

The Confined Space Attendants will be trained in all aspects of the Wesleyan University Confined Space Permit Program including entry, atmosphere monitoring, rescue equipment, rescue notification, hazard recognition and control, duties and responsibilities of entrants and attendants and the particulars of each specific Permit Required Confined Space.

The following checklist is required to be utilized to ensure accuracy of this program:

- ❑ Verify the list of known and or possible hazards for the specific Confined Space is in the Attendant's possession.
- ❑ Knows the signs and symptoms of the entrant's exposure to hazards and understands the consequences of exposure. **(Appendix I)**
- ❑ **Remains stationed outside the Confined Space at all times and must not enter the space under any circumstances including the rescue of an entrant.**
- ❑ Maintains an accurate count of all persons in the space.
- ❑ Monitors activities inside and outside the Confined Space to determine the safety of entrants.
- ❑ Maintains effective, continuous and well rehearsed contact with entrants.
- ❑ Orders evacuation of the Confined Space if:
    - Observes a condition not specified on the permit
    - Behavioral effects of a hazard are observed in the entrant
    - Situation develops outside the space, which could endanger the entrant.
    - An uncontrolled hazard is detected inside the Confined Space.
    - The attendant must leave the Work Station.
- ❑ Keep unauthorized personnel away from the immediate area and do not allow entry into the space by unauthorized entrants.
- ❑ Communication with Rescue Personnel is immediately available.

4.1.3 Confined Space Entrants

The Confined Space Entrants will be trained in all aspects of the Wesleyan University Confined Space Permit Program including entry, atmosphere monitoring, rescue equipment, rescue notification, hazard recognition and control, duties and responsibilities of entrants and attendants and the particulars of each specific Permit Required Confined Space.

The following checklist is required to be utilized to ensure accuracy of this program:

- ❑ Verify the list of known and or possible hazards for the specific Confined Space entry.
- ❑ Knows the signs and symptoms of exposure to hazards and understands the consequences of exposure. (i.e., oxygen deprivation, hydrogen sulfide) **[Appendix I]**
- ❑ Maintains visual contact with all other persons in the space.
- ❑ Monitors activities inside the Confined Space to determine the safety of entrants.
- ❑ Maintains effective and continuous and well rehearsed contact with attendants and immediately notifies attendant when initiating an evacuation.
- ❑ Orders evacuation of the Confined Space if:
    - Observes a condition not specified on the permit
    - Behavioral effects of a hazard are observed in an entrant
    - Situation develops inside the space, which could endanger the entrant.
    - An uncontrolled hazard is detected inside the Confined Space.
    - The attendant must leave the Work Station.
- ❑ Will be trained and knowledgeable of Personal Protective Equipment needed for the possible hazards encountered in the Confined Space.
- ❑ Will have available all PPE needed to perform the activity within the Confined Space.
- ❑ Will have full working knowledge of Wesleyan University's Biosystems Multivision® Air monitoring equipment.
- ❑ Aware of any external barriers or controls needed to protect them from external hazards and the proper use of those barriers and controls.
- ❑ Able to perform a Self-Rescue if:
    - The Attendant orders an evacuation
    - An automatic air monitor alarm is activated
    - An entrant perceives that they are in danger

4.1.4 Rescue Personnel

The Middletown Fire Department's Confined Space Rescue Team only performs rescue Operations by calling MFD Dispatch or through the direct communication link set up before hand.

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Section 4.2 Protocols

4.2.1 Permit Required Entry Protocol

Prior to entry to any Wesleyan University Permit Required Confined Space, regardless of the duration of entry, an Entry Permit **(See Appendix E)** must be authorized by the Dept. of EHS&S or Designee. All portions of the permit must be filled in with specific information as to the Confined Space in question, or marked as N/A (not applicable).

The authorizing agent must ensure that all portions are accurately filled out and any N/A designations must be justified at the agent's discretion. The authorizing agent will then give the Attendant a prepared list of known hazards in the specific Confined Space and discuss potential hazards expected.

The person requesting the permit should ensure that the following items on the permit are accurate:

- ❑ Permit application and date
- ❑ Date and Time Permit will expire
- ❑ Location of Confined Space
- ❑ Name of Permit Entry Supervisor and phone number
- ❑ Brief description of task to be performed inside the Confined Space and a detailed list of the safety, mechanical and auxiliary equipment to be used. This must be a specific description of all items to identify all possible hazards being taken into the Confined Space.
- ❑ Complete checklist for hazard control including detailed description of all activities such as:
    - Air monitoring
    - Lockout/Tagout
    - Inerting the space
    - Line Blanking or Disconnecting
    - Mechanical Movement Disabled
    - Hot Work Permits
    - Established Communication System
- ❑ List of authorized Entrants, date & time entered, date & time out of space
- ❑ List of authorized Attendants to include fire watch, site supervisor, project manager, air quality monitor and any other personnel assigned to watch over the entrants.
- ❑ Complete the Pre-Entry Safety Checklist **(see Appendix F)** to include any air monitoring to be done prior to entry.
- ❑ Signatures of at least two individuals who have working knowledge of safety procedures in the specific Confined Space.
- ❑ Conduct a pre-entry briefing with all personnel involved to review work to be done, safety practices and rescue procedures.

The Entrant's shall make themselves aware of all the requirements of the Confined Space Entry Permit and ask questions as required, review exposure indications and PPE. The Entrants shall review with the Attendant the established and well-practiced method of communication to be used in the Confined Space.

The Attendant shall make themselves aware of all the requirements of the Confined Space Entry Permit and ask questions as required, review exposure indications and PPE. The attendant will also contact the Wesleyan University Public Safety Dispatch who will then contact Middletown Fire Department's confined space rescue team, to alert them of a Permit Required Confined Space entry using **Appendix G, "The Permit Required Confined Space Rescue Notification and Authorization Form"**. The Attendant shall review with the Entrants the established and well-practiced method of communication to be used in the Confined Space.

4.2.2 Non-Permit Required Entry Protocol

Prior to entry to any Wesleyan University Confined Space, regardless of the duration of entry, an Entry Permit **(See Appendix E)** must be authorized by the Dept. of EHS or trained representative. All portions of the permit must be filled in with specific information as to the Confined Space in question, or marked as N/A (not applicable).

The Authorizing Agent must ensure that all portions are accurately filled out and any N/A designations must be justified at the Agent's discretion. The Authorizing Agent will then give the Attendant a prepared list of known hazards in the specific Confined Space and discuss potential hazards expected. Non-Permit Required Confined Spaces need a minimum of two personnel to enter, one as entrant, the other as attendant, rules of Permit Required Confined Space still applies.

The Facility Manager or Foreperson requesting the permit should ensure that the following items on the permit are accurate:

- ❑ Permit application and date
- ❑ Date and Time Permit will expire
- ❑ Location of Confined Space
- ❑ Name of Permit Entry Supervisor and phone number
- ❑ Brief description of task to be performed inside the Confined Space and a detailed list of the safety, mechanical and auxiliary equipment to be used. This must be a specific description of all items to identify all possible hazards being taken into the Confined Space.
- ❑ Complete checklist for hazard control including detailed description of all activities such as:
    - Air monitoring
    - Lockout/Tagout
    - Inerting the space
    - Line Blanking or Disconnecting
    - Mechanical Movement Disabled
    - Hot Work Permits
    - Established Communication System
- ❑ List of authorized Entrants, date & time entered, date & time out of space
- ❑ List of authorized Attendants to include fire watch, site supervisor, project manager, air quality monitor and any other personnel assigned to watch over the entrants.
- ❑ Complete the Pre-Entry Safety Checklist **(see Appendix F)** to include any air monitoring to be done prior to entry.
- ❑ Signatures of at least two individuals who have working knowledge of safety procedures in the specific Confined Space.
- ❑ Conduct a pre-entry briefing with all personnel involved to review work to be done, safety practices and rescue procedures.

The Entrant's shall make themselves aware of all the requirements of the Confined Space Entry Permit and ask questions as required, review exposure indications and PPE. The Entrants shall review with the Attendant the established and well-practiced method of communication to be used in the Confined Space.

The Attendant shall make themselves aware of all the requirements of the Confined Space Entry Permit and ask questions as required, review exposure indications and PPE. The attendant will also contact the Wesleyan University Public Safety Dispatch who will notify Middletown Fire Dept's Confined Space Rescue Team to alert them of a Permit Required Confined Space entry using **Appendix G, "The Permit Required Confined Space Rescue Notification and Authorization Form".** The Attendant shall review with the Entrants the established and well-practiced method of communication to be used in the Confined Space.

4.2.3 Pre-Entry Checklist & Air Monitoring Data

Prior to entry to any Wesleyan University Permit-Required Confined Space, regardless of the duration of entry, an Entry Permit **(See Appendix E)** must be authorized by the Dept. of EHS&S or Designee. All portions of the permit must be filled in with specific information as to the Confined Space in question, or marked as N/A (not applicable).

The Authorizing Agent must ensure that all portions are accurately filled out and any N/A designations must be justified at the Agent's discretion. The Authorizing Agent will then give the Attendant a prepared list of known hazards in the specific Confined Space and discuss potential hazards expected. Non-Permit Required Confined Spaces need a minimum of two personnel to enter, one as entrant, the other as attendant, rules of Permit Required Confined Space still applies.

The Manager, Facility Manager or Foreperson requesting the permit should oversee the Pre-Entry Checklist **(Appendix F)**, and provide it to the Authorizing Agent upon request for a permit. Air monitoring and PPE checklists should be preliminarily reviewed prior to the pre-entry safety brief.

Appendix A

Spaces identified as Confined Spaces

Permit Spaces are areas that fall under the “Permit Required” Definition or a space that has inadequate lighting and ventilation or potential hazards that would require Rescue Operations.

Campus Wide	Butterfield	Clark Hall
Sewer Manholes Electrical Manholes Steam Chases and Manholes Signal Manholes Tunnels	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases Tunnels	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases
Foss Hill Dormitories	**McConaughy Dining Hall**	**Squash Courts**
Crawl Spaces Air Handlers Ventilation Ducts Steam Chases	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases
William Street Highrise	**William Street Lowrise**	**230 Washington Street**
Crawl Spaces Air Handlers Ventilation Ducts Steam Chases	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases
Center for the Arts	**CPP**	
Crawl Spaces Air Handlers Ventilation Ducts Steam Chases Stage Elevator Pit	Crawl Spaces Air Handlers Ventilation Ducts Steam Chases Condensate & DA Feed Tanks Mud & Steam Drums Boilers Firebox Cold Well & Sewage Pits Stacks & Breeching	

Insert campus map with * locations

Appendix B

Biosystems Multivision® Trained personnel and training protocol

Print Name	Signature	Date	Date	Date	Date
William S. Nelligan		5Feb2013			
Ricky Howard		5Feb2013			

Appendix C
Employees trained to wear a respirator

Print Name	Signature	Date	Date	Date	Date
William Nelligan		2/5/13			
Ricky Howard		2/5/13			

Respirator Training is performed in accordance with 29CFR1910.134 and is described and administered by the Wesleyan University Respiratory Protection Plan in conjunction with the Wesleyan University Health Center. All participants have successfully participated in the Wesleyan University Respiratory Protection Plan and have passed the requirements for the year as dated.

A copy of the Wesleyan University Respiratory Protection Plan is maintained in the Wesleyan University Dept. of Environmental Health, Safety& Sustainability office at 170 Long Lane.

Appendix G

"Information for Employees Using Respirators When Not Required Under the Standard"

29CFR1910.134 Appendix D

Respirators are an effective method of protection against designated hazards when properly selected and worn. Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may or wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If your employer provides respirators for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You should do the following:

Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care and warning regarding the respirators limitations

Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will tell you what the respirator is designed for and how much it will protect you.

Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors or very small solid particles of fumes or smoke.

Keep track of your respirator so that you do not mistakenly use someone else's respirator.

[63FR1270, Jan. 8, 1998; 63FR20098, 20099, Apr. 23, 1998]

I, the undersigned, have read the above statement and understand that wearing a respirator of my own or a dust mask type N, on a voluntary basis does not protect me from environmental hazards other than what their manufacturer has assured. I wear this respirator on a voluntary basis and will not hold Wesleyan University responsible for my actions while voluntarily wear this respirator.

If I feel my job or duties demand that I wear a respirator because the atmosphere that I am exposed to could fall above Permissible Exposure Levels (PEL) set by OSHA, I will contact the Wesleyan University Dept. of Environmental Health & Safety at ext. 2771 and discuss a monitoring program and enrollment in the Wesleyan University Respiratory Protection Program.

Print Name	Date	Segment	Job Description

Signature	Supervisor	Phone Number

Appendix E
Confined Space Entry Permit

Appendix F

Pre-Entry Safety Checklist

ENTRY PRECAUTIONS AND PROCEDURES

The Dept. of EHS&S will be responsible for evaluating the workplace to determine if it is a permit-required space and accordingly. In general when dealing with a PRCS, the following matters should be addressed in developing an overall entry plan.

1. Determine necessity to enter space. Can task be accomplished without entering?
2. Try to determine what substance(s) were previously contained in the space. Also, it is important to know what conditions such as excessive rusting of metal may have occurred. This information will help determine need for special testing requirements.
3. Test air for oxygen content and for toxic, flammable and oxygen-displacing gases/vapors. See section below on air testing.
4. Assure that all instruments used in air testing are properly calibrated and in good working order.
5. Determine need for special clothing and protective equipment or supplies, i.e., boots, gloves, chemical suits, hard hat eye and ear protection. Assure that all such equipment is readily available, in good condition and worn as required.
6. Determine the need for respiratory protection, lifelines, escape harness and special communication devices, i.e., radio. Each entry will require different equipment depending on the expected hazard. Some situations may require the use of safety lines/harnesses, air supplied breathing apparatus, continuous or frequent atmospheric monitoring, continuous ventilation and that a trained standby "buddy" person be on the outside ready for any emergency.
7. Respirators when required, must be of the right type, i.e., air supplied, air purifying, SCBA, etc. and be NIOSH approved. Personnel must be properly trained in their use.
8. Ventilate space as necessary, assuring that intake air is free of harmful contaminants. Determine need for continued ventilation.
9. Use only intrinsically safe, grounded, explosion proof equipment. If lighting is necessary, use battery powered devices such as hand's free" headlamps or flashlights.
10. As necessary, arrange for any steam, water, heat, gas or power lines effecting the confined space to be shut off by authorized personnel. (lockout/tagout)
11. Assure that lockout/tagout methods are used to prevent the startup of electrical or other energy sources that could jeopardize anyone in the space.
12. Where there is risk for persons or objects falling into confined space opening, a barricade or other means of warning should be used.

TESTING THE ATMOSPHERE

Testing the air within confined space for oxygen content and for toxic and/or flammable gases or vapors is perhaps the most critical precautions to be taken.

It is important to remember that many toxic gases and vapors are colorless and odorless and cannot therefore be detected by your senses. Nor can you determine the oxygen level that is present. Testing can only be accomplished by means of properly calibrated test equipment.

Detection monitors capable of measuring oxygen levels, carbon monoxide, hydrogen sulfide, and combustible gases/vapors are available for testing confined space atmospheres. The testing equipment used at Wesleyan may change from time to time. Accordingly, it will be necessary to refer to separate Instructions for specific monitors being used.

It is important to understand that some gases/vapors are heavier or lighter than air and may settle to the bottom or accumulate at the top of the confined space. Therefore, it is necessary to test all area (top, middle, bottom) of a confined space to be sure of its safety. If any readings indicate an oxygen deficiency or the presence of toxic or flammable substances, the space must be ventilated and retested before entry.

Only trained personnel are authorized to conduct the air testing. Do not attempt to use test equipment until you are absolutely sure how to use it and that you have checked its accuracy (calibration) before and after each use in accordance with the manufacturer's instructions.

TESTING PROCEDURES

Testing shall be performed for oxygen, combustible gases or vapors, and toxic gases or vapors in that sequence before opening the space by probing with the test instruments near the entry.

Placing the monitor probe through the hole in the manhole and drawing air into the instrument will do this. Once the space is opened, test the air 2 feet below the surface, 1 to 2 feet above the bottom of the structure, and at mid height of the depth. Also, test all corners and spaces where gases/vapors might accumulate or pocket keeping in mind that some are heavier or lighter than air. Affected employees will be given the opportunity to observe all pre-entry testing.

In some cases it may be necessary to test for gases or vapors other than those measured by the available detection/monitor. The potential for the presence of other toxic substances will be assessed prior to entry and will be based on such factors as products that may have been stored in the spaces, other work being performed in the space, or potential toxicants from nearby or adjacent areas.

Record all readings and their locations. If any of the tests indicate that hazards may exist in the confined space, the project supervisor and/or the Dept. of EHS&S shall be notified.

DO NOT ENTER THE CONFINED SPACE IF THERE IS ANY INDICATION OF DANGER.

Reading outside the following limits indicates problems and entry shall not be made under any circumstances:

a. Oxygen levels less than 19.5% or greater than 23.5%.
b. Carbon monoxide level greater than 35 parts per million, (ppm).
c. Hydrogen sulfide level greater than 10 ppm.

d. The percentage of the lower explosion limit, (LEL), must be less than 10% to permit any type of hot work. This limit does not mean that atmosphere is toxic free.
e. All other air contaminants are within their threshold limit values or permissible exposure levels.

Appendix G

"The Permit Required Confined Space Rescue Notification and Authorization Form".

Appendix H
Annual Review and Training Documentation

Appendix I
Signs & Symptoms of Exposure to Confined Space Hazards

Hazardous Atmosphere

Because of inadequate ventilation there is a potential for hazardous atmospheres to develop within confined spaces. Hazardous atmospheres include those, which are flammable, toxic, irritating, and asphyxiating. Deadly amounts of toxic vapors and gases can form and accumulate within such spaces. Some are capable of causing respiratory failure or death from even brief exposures. An extremely dangerous condition often encountered in confined spaces is oxygen deficiency. This occurs when the normal level of oxygen in air is reduced by consumption or displacement, creating an asphyxiation hazard. Fires and explosions are other potential dangers encountered in confined spaces. Flammable atmospheres from the use or presence of chemicals, paints, petroleum products, solvents, reactants, combustible dusts, etc. may accumulate and be trapped within confined spaces. Such flammable materials when mixed with oxygen present severe explosion risks if ignition from sparks, static electricity, unapproved electrical equipment, or any other heat source is possible.

Physical Hazards

In addition to the above atmospheric type hazards, general physical hazards such as from temperature extremes, slipping or falling on slick/wet surfaces, moving parts, falling objects, high noise levels, and engulfment in loose, granular materials, etc. must also be recognized in confined spaces. Other hazards that may exist include electrocution from live wires, skin contact with contaminated or corrosive materials and bites from insects, snakes and rodents. Good illumination and the ability to communicate without interference while in confined spaces are essential.

HAZARDOUS GASES WHICH MAY BE FOUND IN CONFINED SPACES

Carbon Monoxide: A very toxic colorless, odorless, tasteless gas generated from incomplete combustion of organic materials, gasoline or diesel fueled engines.

Hydrogen Sulfide: A colorless, gas with a strong odor of rotten eggs at low concentrations. At high concentrations the sense of smell is impaired. This gas is extremely toxic at higher concentrations.

Carbon Dioxide: A colorless, odorless gas, which is a by-product of fermentation and combustion. While not toxic in itself, it will displace breathable air at high concentrations creating a very dangerous situation. ie, oxygen deficiency

TYPICAL SYMPTOMS OF OVEREXPOSURE

1. Symptoms associated with oxygen deficiency and other causes for asphyxiation include headache, dizziness, drowsiness, and nausea. Prolonged exposure could lead to convulsions, unconsciousness and death.
2. Symptoms from over-exposure to solvents, gases and vapors may include lightheadedness, eye and/or nose and throat irritation.

   If you experience any of these symptoms while in a confined space, get out and/or call for help immediately.