UNIVERSITY OF LOUISVILLE
DEPARTMENT OF PHYSICAL PLANT

WRITTEN CONFINED SPACE PROGRAM

Program Contents

(Revised 2/1/08)

Confined Space Written Program

Purpose of Program

Scope of Program

Definitions

Section I – General Program Requirements

A. Identification of Confined Spaces

{A_1} Confined Space Evaluations

{A_2} Identifying Confined Space Locations – Signage

B. Contractors and Confined Spaces

{B_1} Physical Plant's Responsibility to Inform Contractors of Hazards

{B_2} Contractors Responsibility When Entering Confined Spaces

C. Confined Space Program Requirements

{C_1} Permit-Required Confined Space Program Requirements

{C_2} Conditions for Use of "Alternate Procedures" for Confined Space Entry

{C_3} Alternate Procedures Entry

{C_4} Non-Permit Required Space Entry Procedures

Section II – Specific Program Requirements

A. Written Confined Space Evaluations

1 – Sewer System

2 – Sewage Ejector Pump Basins

3 – Coal Bunker

4 – Electrical Vaults (Energized)

5 – PIV/Water Meter Vaults

6 – Ash Silo

7 – Communication Vaults

8 – Water Tank

9 – Flash Tank

10 – Steam and Mud Drums

11 – De-Aeration Tanks

12 – Elevator Pits

13 – Morrison Tube Boiler

14 – Electrical Vaults (De-Energized)

15 – Boiler Fire Box

16 – Boiler Breaching

17 – Package Boiler Stack

18 – Roof Cooling Towers

19 – HVAC Duct Work

20 – Tunnel System

21 – Attics

22 – Air Handling Units

Section III – Specific Program Hazards

A. Confined Space Specific Hazards

A – Welding Torch

B – Hazardous Chemicals/Materials

C – H_2S Safety Fact Sheet

D – H_2S Material Safety Data Sheet (MSDS)

Section IV – Specific Program Training

A. Written Employee Training Modules

Safety Meeting Repros

OSHA Training System

7 Minute Safety Trainer

UNIVERSITY OF LOUISVILLE
DEPARTMENT OF PHYSICAL PLANT

CONFINED SPACE PROGRAM

Purpose of Program

The University of Louisville's Physical Plant Department (PPD) has determined, through **Confined Space Evaluations**, that the University has permit-required, non-permit required, and restricted access spaces and needs written procedures for safe entry into these spaces.

In order to protect the PPD's employees from the hazards associated with confined space entry and to comply with Local, State and Federal Regulations, this **Permit-Required Confined Space Entry Program** has been developed, written and implemented.

This program applies to all work operations at the University of Louisville where PPD employees must enter a permit-required, non-permit required or restricted access space as part of their job duties.

Any employee whose job requires entry into a confined space will be given this program to review. These employees will also receive training on all aspects of confined space entry.

Under no circumstance can an employee enter a confined space with out having reviewed the written program and received the proper confined space entry training!

The PPD Safety Manager is responsible for this **Permit-Required Confined Space Entry Program**. This includes; evaluation of confined spaces, employee training, initially contacting rescue services about our confined spaces, purchase and maintenance of equipment and air monitoring devices, and deciding if a permit-required space can be reclassified as a non-permit or restricted access space.

The PPD Safety Manager will review and update this program at least annually

Scope of Program

Under this program, the PPD identifies permit-required, non-permit and restricted access spaces at the University of Louisville.

We provide information and training for PPD employees according to their responsibilities in the confined space. These employees receive a copy of this written procedure, training and instructions for safe entry into our specific type of confined spaces. A copy of this written program is also kept in the PPD Safety Manager's office and is available for inspection by employees or their authorized representative.

This program is designed to ensure that safe work practices are utilized during all activities regarding the permit-required, non-permit or restricted access space to prevent personal injuries and illnesses that could occur.

If, after reading this program, participating in training or performing a confined space entry, you find that improvements can be made, please contact the PPD's Safety Manager at 852-6241.

We welcome all suggestions because we are committed to creating a safe workplace for all our employees. A safe and effective permit-required confined space entry program is an important component of our overall safety plan. We strive for open and honest communication, clear understanding, safe work practices, and employee involvement in the program.

The University of Louisville's PPD does not have the authority or responsibility to enforce this regulation for contractors not working for the PPD or for employees from other University of Louisville departments.

* Definitions

a. Confined Space - A space that:

1) Is large enough and so configured that an employee can bodily enter and perform work;
2) Has limited or restricted means for entry or exit; and
3) Is not designed for continuous employee occupancy.

b. Permit-Required Confined Space – A 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 entrant.
3) 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.
4) Contains any other recognized serious safety or health hazard.

c. Entry – Is considered to have occurred when any part of the entrant's body breaks the plane across the opening of a confined space.

d. Hazardous Atmosphere - Any atmosphere that exposes an employee to the risk of death, incapacitation, impairment of ability to self-rescue and an injury or acute illness from one or more of the following causes:

1) Has levels of flammable/explosive gas, vapor, or mist at or above 10% of their Lower Explosive Limit (LEL).

2) Has airborne combustible dust at concentrations at or above the LEL. (This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet or less.)

3) Has atmospheric oxygen levels below 19.5% or above 23.5%.

4) Has any other Immediately Dangerous to Life or Health (IDLH) atmospheric condition.

e. Oxygen Deficient Atmosphere - Air that contains less than 19.5% oxygen.

f. Oxygen Enriched Atmosphere - Air that contains more than 23.5% oxygen.

g. Retrieval System - Equipment used by the attendant(s) to perform non-entry rescue of the entrant from the confined space.

h. Entrant - Personnel trained to enter a confined space to perform a task or a rescue.

i. Attendant - Personnel trained to stay outside of the confined space and monitor progress of the entrant.

j. Entry Supervisor - Personnel trained and responsible for determining if acceptable entry conditions are present at a permit or restricted access space where entry is planned. They are also responsible for authorizing entry, overseeing entry operations, completing pre-entry and entry checklist, and terminating entry if a hazardous condition arises.

k. Engulfment – The 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.

l. Immediately Dangerous to Life and Health (IDLH) – Any atmospheric, mechanical, physical, electrical, etc. condition in a confined space that poses an immediate or delayed threat to life, would cause irreversible adverse health effects or would interfere with an individuals ability to escape unaided from the confined space.

m. Non-Permit Confined Space - A 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

* A list of all applicable definitions concerning confined space entry may be found in section (b) of OSHA's Confined Space Standard, contained in **Appendix M** of this written program.

Section I

General Program Requirements

A. Identification of Confined Spaces

{A_1} Confined Space Evaluations

1) A survey of the University of Louisville campuses has been completed and **Confined Space Evaluations** of the identified permit-required, non-permit and restricted access spaces have been completed.

2) These **Confined Space Evaluations** define safe entry procedures and equipment necessary to enter each of these permit-required, non-permit and restricted access spaces safely.

3) These **Confined Space Evaluations** are contained in **Section II, Specific Program Requirements,** of this written program.

4) Only the first six (6) **Confined Space Evaluations** in **Section II, Specific Program Requirements,** (energized electrical vaults, coal bunker, PIV/Water meter vaults, ash silo, sewage ejector pump basins, and manholes providing access to the sewer system), **must always be classified as Permit-Required Confined Spaces.** This is necessary because all the hazards in these spaces cannot be eliminated prior to personnel entering these spaces.

6) All the other confined spaces, with the proper elimination of their hazards, may be reclassified as a non-permit or restricted access space.

{A_2} Identifying Confined Space Locations - Signage

1) PPD employees will be given information on the location of all permit-required confined space hazards during the yearly employee training.

2) Locations of confined space hazards are also indicated in the **Confined Space Evaluations** contained in Section II, Specific Program Requirements, of this written program.

3) Signs, where appropriate, will designate areas containing permit-required confined spaces and these areas will be secured by locks, bolted covers or location.

4) A sign reading:

DANGER

PERMIT-REQUIRED CONFINED SPACE

DO NOT ENTER

Or, with other similar language, will be posted on each permit-required confined space.

B. Contractors and Confined Spaces

{B_1} Physical Plant's Responsibility to Inform Contractors of Hazards

***See Appendix F for a one-page form concerning PPD's and Contractor's responsibilities to each other during confined space entries**

When the PPD arranges to have employees of another employer (Contractor) perform work that involves permit space entry, the PPD will:

1) Inform the Contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of **OSHA's Permit-Required Confined Space Entry Standard, 29 CFR 1910.146**; {1910.146(c)(8)(i)}

2) Apprise the Contractor of the elements, including the hazards identified and the PPD's experience with the space, that make the space in question a permit space; {1910.146(c)(8)(ii)}

3) Apprise the Contractor of any precautions or procedures that the PPD has implemented for the protection of employees in or near permit spaces where Contractor personnel will be working; {1910.146(c)(8)(iii)}

4) Coordinate entry operations with the Contractor, when both PPD personnel and Contractor personnel will be working in or near permit spaces, and {1910.146(c)(8)(iv)}

5) Debrief the Contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations. {1910.146(c)(8)(v)}

{B_2} Contractor's Responsibility When Entering Confined Spaces

***See Appendix F for a one-page form concerning PPD's and Contractor's responsibilities to each other during confined space entries**

In addition to complying with the permit space requirements that apply to all employers, each Contractor who is retained to perform permit space entry operations by the PPD will:

1) Obtain any available information regarding permit space hazards and entry operations from the PPD; {1910.146(c)(9)(i)}

2) Coordinate entry operations with the PPD, when both PPD personnel and Contractor personnel will be working in or near permit spaces; and {1910.146(c)(9)(ii)}

3) Inform the PPD of the permit space program that the Contractor will follow and of any hazards confronted or created in permit spaces during the entry operation. {1910.146(c)(9)(iii)}

C. Confined Space Program Requirements

{C_1) Permit-Required Confined Space Program Requirements

Under the Permit-Required Confined Space Program, the PPD will:

1) Implement the measures necessary to prevent unauthorized entry; {1910.146(d)(1)}

2) Identify and evaluate the hazards of permit spaces before employees enter them; {1910.146(d)(2)}

3) Develop and implement the means, procedures, and practices necessary for safe permit space entry operations, including, but not limited to, the following: {1910.146(d)(3)}

   a) Specifying acceptable entry conditions; {1910.146(d)(3)(i)}

   b) Providing each authorized entrant, or that employee's authorized representative, with the opportunity to observe any monitoring or testing of permit spaces; {1910.146(d)(3)(ii)}

   c) Isolating the permit space; {1910.146(d)(3)(iii)}

   d) Purging, inerting, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards; {1910.146(d)(3)(iv)}

   e) Providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards; and {1910.146(d)(3)(v)}

f) Verifying that conditions in the permit space are acceptable for entry throughout the duration of an authorized entry. {1910.146(d)(3)(vi)}

g) *** Rescue Services will be on site whenever a hazardous or explosive atmosphere is detected prior to Physical Plant employees entry and/or before ventilation procedures are enacted. Rescue Services will also be called to the site whenever a hazardous or explosive atmosphere is detected and employees must leave the space. Physical Plant employees cannot re-enter space without Rescue Services on site.

4) Provide the following equipment at no cost to employees, maintain that equipment, and ensure that employees use that equipment properly: {1910.146(d)(4)}

a) Testing and monitoring equipment to sample for oxygen deficiencies, explosive and toxic gases; {1910.146(d)(4)(i)}

b) Ventilating equipment needed to obtain and maintain acceptable entry conditions; {1910.146(d)(4)(ii)}

c) Communications equipment necessary for continuous communication between attendant and entrant; {1910.146(d)(4)(iii)}

d) Personal protective equipment for use when feasible engineering and/or work practice controls do not adequately protect employees; {1910.146(d)(4)(iv)}

e) Lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency; {1910.146(d)(4)(v)}

f) Barriers and shields as necessary to protect entrants and attendants; {1910.146(d)(4)(vi)}

g) Equipment, such as ladders, needed for safe entry and exit by authorized entrants; {1910.146(d)(4)(vii)}

h) Rescue and emergency equipment needed, except to the extent that the equipment is provided by rescue services; and {1910.146(d)(4)(viii)}

i) Any other equipment necessary for safe entry into and rescue from permit spaces. {1910.146(d)(4)(ix)}

5) Evaluate permit space conditions as follows when entry operations are conducted: {1910.146(d)(5)}

a) Test conditions in the permit space to determine if acceptable entry conditions exist before entry is authorized to begin, except that, if isolation of the space is infeasible because the space is large or is part of a continuous system (such as a sewer), pre-entry testing will be performed to the extent feasible before entry is authorized and, if entry is authorized,

entry conditions will be continuously monitored in the areas where authorized entrants are working; {1910.146(d)(5)(i)}

b) Test or monitor the permit space as necessary to determine if acceptable entry conditions are being maintained during the course of entry operations; and {1910.146(d)(5)(iii)}

c) When testing for atmospheric hazards, the attendant will test first for oxygen, then for combustible gases and vapors, and then for toxic gases and vapors. {1910.146(d)(5)(iii)}

d) Provide each authorized entrant or that employee's authorized representative an opportunity to observe the pre-entry and any subsequent testing or monitoring of permit spaces; {1910.146(d)(5)(iv)}

e) Reevaluate the permit space in the presence of any authorized entrant or that employee's authorized representative who requests that the PPD conduct such reevaluation because the entrant or representative has reason to believe that the evaluation of that space may not have been adequate; {1910.146(d)(5)(v)}

f) Immediately provide each authorized entrant or that employee's authorized representative with the results of any testing conducted in accord with this program. {1910.146(d)(5)(vi)}

NOTE: Atmospheric testing conducted in accordance with **Appendix C** of this written program will satisfy the requirements of section {C_1}(5). For permit space operations in sewers, atmospheric testing conducted in accordance with **Appendix C**, as supplemented by **Appendix D** of this written program, will satisfy the requirements of section {C_1}(5).

6) Provide at least one attendant outside the permit space into which entry is authorized for the duration of entry operations; {1910.146(d)(6)}

NOTE: Attendants may be assigned to monitor more than one permit space provided their duties can be effectively performed for each permit space that is monitored. Likewise, attendants may be stationed at any location outside the permit space to be monitored as long as their duties can be effectively performed for each permit space that is monitored.

a) If a single attendant is monitoring multiple spaces, means and procedures to enable the attendant to respond to an emergency affecting one or more of the permit spaces being monitored without distraction from the attendant's other responsibilities must be in place; {1910.146(d)(7)}

7) Designate the persons who are to have active roles (as, for example, authorized entrants, attendants, entry supervisors, or persons who test or monitor the atmosphere in a permit space) in entry operations, identify the duties of each such employee, and provide each such employee with the proper training; {1910.146(d)(8)}

8) Develop and implement procedures for summoning rescue and emergency services, for rescuing entrants from permit spaces, for providing necessary emergency services to rescued employees, and for preventing unauthorized personnel from attempting a rescue; {1910.146(d)(9)}

9) Develop and implement a system for the preparation, issuance, use, and cancellation of entry permits as required by this section; {1910.146(d)(10)}

10) Develop and implement procedures to coordinate entry operations when employees of more than one employer are working simultaneously as authorized entrants in a permit space, so that employees of one employer do not endanger the employees of any other employer; {1910.146(d)(11)}

11) Develop and implement procedures (such as closing off a permit space and canceling the permit) necessary for concluding the entry after entry operations have been completed; {1910.146(d)(12)}

12) Review entry operations when the PPD has reason to believe that the measures taken under the permit space program may not protect employees and revise the program to correct deficiencies found to exist before subsequent entries are authorized; and {1910.146(d)(13)}

NOTE: Examples of circumstances requiring the review of the permit space program are: any unauthorized entry of a permit space, the detection of a permit space hazard not covered by the permit, the detection of a condition prohibited by the permit, the occurrence of an injury or near-miss during entry, a change in the use or configuration of a permit space, and employee complaints about the effectiveness of the program.

13) Review the permit space program, using the canceled permits, within 1 year after each entry and revise the program as necessary to ensure that employees participating in entry operations are protected from permit space hazards. {1910.146(d)(14)}

{C_2} Conditions for Use of "Alternate Procedures" for Confined Space Entry

The PPD may use certain specified <u>"Alternate Procedures"</u> for entering a confined space if the following specific conditions are met: {1910.146(c)(5)(i)}

1) The only hazard posed by the permit space is an actual or potential hazardous atmosphere; {1910.146(c)(5)(i)(A)}

2) Continuous forced air ventilation alone is sufficient to keep that permit space safe for entry; {1910.146(c)(5)(i)(B)}

3) The PPD develops monitoring and inspection data that supports the demonstrations required in numbers 1) and 2) above. {1910.146(c)(5)(i)(C)}

4) If an initial entry of the permit space is necessary to obtain the data required by number 3) above, the entry is performed in compliance with the **Permit-**

Required Confined Space Entry Program found in section {C_1} of this written program. {1910.146(c)(5)(i)(D)}

5) The determinations and supporting data required by numbers 1), 2) and 3) above are documented by the PPD and are made available to each employee who enters the permit space under the terms of the alternate procedures. {1910.146(c)(5)(i)(E)}

NOTE: See section {C_4} of this written program for reclassification of a permit-required space to a non-permit required space after all hazards within the space have been eliminated.

{C3} Alternate Procedures Entry

Entry into the permit space under <u>"Alternate Procedures"</u> must be performed in accordance with the following requirements: {1910.146(c)(5)(ii)}

{Hazardous Atmosphere is the Only Confined Space Hazard}

1) Any conditions making it unsafe to remove an entrance cover will be eliminated before the cover is removed. {1910.146(c)(5)(ii)(A)}

2) When entrance covers are removed, the opening will be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space. {1910.146(c)(5)(ii)(B)}

3) Before a PPD employee enters the space, the internal atmosphere will be tested, with a calibrated, direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order.

4) Any PPD employee who enters the space, or that employee's authorized representative, will be provided an opportunity to observe the pre-entry testing. {1910.146(c)(5)(ii)(C)}

5) There must be no hazardous atmosphere within the space whenever any PPD employee is inside the space. {1910.146(c)(5)(ii)(D)}

{Use of Continuous Forced Air Ventilation}

6) A PPD employee must not enter the space until the forced air ventilation has eliminated any and all hazardous atmosphere(s); {1910.146(c)(5)(ii)(E)(1)}

7) The forced air ventilation will be directed to ventilate the immediate areas where a PPD employee is or will be present within the space and shall continue until all employees have left the space; {1910.146(c)(5)(ii)(E)(2)}

8) The air supply for the forced air ventilation will be from a clean source and must not increase the hazards in the space. {1910.146(c)(5)(ii)(E)(3)}

{Monitoring and Inspection Data}

9) The atmosphere within the space will be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing a hazardous atmosphere. Any PPD employee who enters the space, or that employee's authorized representative, will be provided with an opportunity to observe the periodic testing. {1910.146(c)(5)(ii)(F)}

{Hazardous Atmosphere Detected During Entry}

10) Each employee will leave the space immediately; {1910.146(c)(5)(ii)(G)(1)}

11) The space will be evaluated to determine how the hazardous atmosphere developed; and {1910.146(c)(5)(ii)(G)(2)}

12) Measures will be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place. {1910.146(c)(5)(ii)(G)(3)}

13) The PPD Supervisor will verify that the space is safe for entry and that the pre-entry measures have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification will be made before entry and will be made available to each employee entering the space or to that employee's authorized representative. {1910.146(c)(5)(ii)(H)}

14) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the PPD Supervisor will reevaluate that space and, if necessary, reclassify it as a permit-required confined space. {1910.146(c)(6)

{C4} Non-Permit Required Space Entry Procedures

A space classified as a permit-required confined space may be reclassified as a non-permit required confined space under the following procedures:

1) *** If the permit space poses no actual or potential atmospheric hazards and if all other hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated. {1910.146(c)(7)(i)}

2) If it is necessary to enter the permit space to eliminate hazards, the entry will be performed under the **Permit-Required Confined Space Entry Procedures,** section {C_1} of this written program. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated. {1910.146(c)(7)(ii)}

NOTE: Control of atmospheric hazards through forced air ventilation does not constitute elimination of the hazards. Sections {C_2} and {C_3} , "Alternate Procedures," of this written program covers permit space entry where the employer can demonstrate that forced air ventilation alone will control all hazards in the space.

3) The PPD Entry Supervisor will document the basis for determining that all hazards in a permit space have been eliminated, through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification will be made available to each employee entering the space or to that employee's authorized representative. {1910.146(c)(7)(iii)}

4) If hazards arise within a permit space that has been declassified to a non-permit space, each employee will exit the space. The PPD Entry Supervisor will then evaluate the space and determine whether it must be reclassified as a permit space. If testing and inspection during that evaluation demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated. {1910.146(c)(7)(iv)}

D. Permit System

{D_1} Before Employees Enter Space….

Before entry into the confined space is authorized, the PPD Entry Supervisor will ensure the following:

1) That they have documented the completion of the measures required by section **{C_1}(3)** of this written program by preparing a confined space entry permit. {1910.146(e)(1)}

2) That before entry begins, the PPD Entry Supervisor identified on the permit has signed the entry permit to authorize entry. {1910.146(e)(2)}

3) That the completed permit is made available at the time of entry to all authorized entrants or their authorized representatives, by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed. {1910.146(e)(3)}

4) That the duration of the permit may not exceed the time required to complete the task or job identified on the permit. {1910.146(e)(4)}

{D_2} Entry Permit Termination….

The PPD Entry Supervisor will:

1) Terminate entry and cancel the entry permit when the entry operations covered by the entry permit have been completed; or {1910.146(e)(5)(i)}

2) Terminate entry and cancel the entry permit when a condition that is not allowed under the entry permit arises in or near the permit space. {1910.146(e)(5)(ii)}

3) Also retain each canceled entry permit for at least 1 year to facilitate the review of the permit-required confined space program. Any problems encountered during an entry operation will be noted on the pertinent permit so that appropriate revisions to the permit space program can be made. {1910.146(e)(6)}

{D_3} Written Entry Permit….

The entry permit that documents compliance with this section and authorizes entry to a permit space will identify:

1) The permit space to be entered; {1910.146(f)(1)}

2) The purpose of the entry; {1910.146(f)(2)}

3) The date and the authorized duration of the entry permit; {1910.146(f)(3)}

4) The authorized entrants within the permit space, by name or by such other means (for example, through the use of rosters or tracking systems) as will enable the attendant to determine quickly and accurately, for the duration of the permit, which entrants are inside the permit space; {1910.146(f)(4)}

5) The personnel, by name, currently serving as attendants; {1910.146(f)(5)}

6) The individual, by name, currently serving as Entry Supervisor, with a space for the signature or initials of the Entry Supervisor who originally authorized entry; {1910.146(f)(6)}

7) The hazards of the permit space to be entered; {1910.146(f)(7)}

8) The measures used to isolate the permit space and to eliminate or control permit space hazards before entry; {1910.146(f)(8)}

   NOTE: Those measures can include the lockout or tagging of equipment and procedures for purging, inerting, ventilating, and flushing permit spaces.

9) The acceptable entry conditions; {1910.146(f)(9)}

10) The results of initial and periodic tests, accompanied by the names or initials of the testers and by an indication of when the tests were performed; {1910.146(f)(10)}

11) The rescue and emergency services that can be summoned and the means (such as the equipment to use and the phone numbers to call) for summoning those services; {1910.146(f)(11)}

12) The communication procedures used by authorized entrants and attendants to maintain contact during the entry; {1910.146(f)(12)}

13) The equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided; {1910.146(f)(13)}

14) Any other information necessary, given the circumstances of the particular confined space, in order to ensure employee safety; and

(15) Any additional permits, such as for "hot work," which has been issued to authorize work in the permit space. {1910.146(f)(14)}

E. Training

{E_1} General Employee Training….

The PPD will provide training so all employees acquire the understanding, knowledge, and skills necessary to safely perform confined space entry duties as follows:

1) Training will be provided to each affected employee:

   a) Before the PPD employee is first assigned duties under this section; {1910.146(g)(2)(i)}

   b) Before there is a change in assigned duties; {1910.146(g)(2)(ii)}

   c) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained; {1910.146(g)(2)(iii)}

   d) Whenever the PPD Entry Supervisor has reason to believe either that there are deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures. {1910.146(g)(2)(iv)}

3) The training will establish employee proficiency in the duties required and will introduce new or revised procedures, as necessary. {1910.146(g)(3)}

4) The PPD's Safety Manager will certify that the training required has been accomplished. The certification will contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification will be available for inspection by employees and their authorized representatives. {1910.146(g)(4)}

F. Authorized Entrants

{F_1} Duties of Authorized Entrants….

The PPD Entry Supervisor will ensure that all Authorized Entrants:

1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of any exposure(s) to hazardous materials; {1910.146(h)(1)}

2) Properly use equipment; {1910.146(h)(2)}

3) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space; {1910.146(h)(3)}

4) Alert the attendant whenever: {1910.146(h)(4)}

   a) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or {1910.146(h)(4)(i)}

   b) The entrant detects a prohibited condition; and {1910.146(h)(4)(ii)}

5) Exit from the permit space as quickly as possible whenever: {1910.146(h)(5)}

   a) An order to evacuate is given by the attendant or the entry supervisor, {1910.146(h)(5)(i)}

   b) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation, {1910.146(h)(5)(ii)}

   c) The entrant detects a prohibited condition, or {1910.146(h)(5)(iii)}

   d) An evacuation alarm is activated. {1910.146(h)(5)(iv)}

G. Attendants

{G_1} Duties of Attendants….

The PPD Entry Supervisor will ensure that each Confined Space Entry Attendant:

1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of any exposure(s) to hazardous materials; {1910.146(i)(1)}

2) Is aware of the possible behavioral effects of hazard exposure in authorized entrants; {1910.146(i)(2)}

3) Continuously maintains an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants accurately identifies who is in the permit space; {1910.146(i)(3)}

4) Remains outside the permit space during entry operations until relieved by another attendant; {1910.146(i)(4)}

NOTE: When the employer's permit entry program allows attendant entry for rescue, attendants may enter a permit space to attempt a rescue if they have been trained and equipped for rescue operations as required by **Section J - Emergencies** of this written program and if they have been relieved as required by paragraph {G_1}(4) of this written program.

5) Communicates with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the space; {1910.146(i)(5)}

6) Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions: {1910.146(i)(6)}

a) If the attendant detects a prohibited condition; {1910.146(i)(6)(i)}

b) If the attendant detects the behavioral effects of hazard exposure in an authorized entrant; {1910.146(i)(6)(ii)}

c) If the attendant detects a situation outside the space that could endanger the authorized entrants; or {1910.146(i)(6)(iii)}

d) If the attendant cannot effectively and safely perform all the duties required under section {G_1} of this written program; {1910.146(i)(6)(iv)}

7) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards; {1910.146(i)(7)}

8) Takes the following actions when unauthorized persons approach or enter a permit space while entry is underway: {1910.146(i)(8)}

a) Warn the unauthorized persons that they must stay away from the permit space; {1910.146(i)(8)(i)}

b) Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and {1910.146(i)(8)(ii)}

c) Inform the authorized entrants and the Entry Supervisor if unauthorized persons have entered the permit space; {1910.146(i)(8)(iii)}

9) Performs non-entry rescues as specified by the PPD's rescue procedure; and {1910.146(i)(9)}

10) Performs no duties that will interfere with the attendant's primary duty to monitor and protect the authorized entrants. {1910.146(i)(10)}

H. Entry Supervisor

{H_1} Duties of the Entry Supervisor….

The PPD Safety Manager will ensure that each Entry Supervisor:

1) Knows the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of any exposure(s) to hazardous materials; {1910.146(j)(1)}

2) Verifies, by checking that the appropriate entries have been made on the permit, that all tests specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin; {1910.146(j)(2)}

3) Terminates the entry and cancels the permit as required by section {D2} of this written program; {1910.146(j)(3)}

4) Verifies that rescue services are available and that the means for summoning them are operable; {1910.146(j)(4)}

5) Removes unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and {1910.146(j)(5)}

6) Determines, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained. {1910.146(j)(6)}

J. Emergencies

{J_1} Rescue and Emergency Services Personnel Evaluation….

When designating Rescue and Emergency Services, The DPP Safety Manger and Entry Supervisor(s) will:

1) Evaluate a prospective Rescue Service's ability to respond to a rescue summons in a timely manner, considering the hazard(s) identified; {1910.146(k)(1)(i)}

Note to section {J_1}(l) above: What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1910.134, Respiratory Protection, requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

2) Evaluate a prospective Rescue Service's ability, in terms of proficiency with rescue-related tasks and equipment, to function appropriately while rescuing entrants from the particular types of permit spaces identified; {1910.146(k)(1)(ii)}

3) Select a Rescue Service from those evaluated that: {1910.146(k)(1)(iii)}

   a) Has the capability to reach the victim(s) within a time frame that is appropriate for the permit space hazard(s) identified; {1910.146(k)(1)(iii)(A)}

   b) Is equipped for and proficient in performing the needed rescue services; {1910.146(k)(1)(iii)(B)}

4) Inform each Rescue Service of the hazards they may confront when called on to perform rescue at the site; and {1910.146(k)(1)(iv)}

5) Provide the Rescue Service selected with access to all permit spaces from which rescue may be necessary so the Rescue Service can develop appropriate rescue plans and practice rescue operations. {1910.146(k)(1)(v)}

Appendix E of this written program has criteria that the DPP can use in evaluating prospective Rescue Services as required by **Section J - Emergencies** of this written program.

{J_2} Duties of DPP Employees Who Provide Rescue and Emergency Services….

When DPP employees are designated to provide Permit Space Rescue and Emergency Services, the DPP Safety Manager and Entry Supervisor will take the following measures:

1) Provide affected employees with the personal protective equipment (PPE) needed, at no cost to those employees, to conduct permit space rescues safely and train affected employees so they are proficient in the use of that PPE; {1910.146(k)(2)(i)}

2) Train affected employees to perform assigned rescue duties. The DPP Safety Manager and Entry Supervisor must ensure that such employees successfully complete the training required to establish proficiency as an authorized entrant; {1910.146(k)(2)(ii)}

3) Train affected employees in basic first-aid and cardiopulmonary resuscitation (CPR). The Entry Supervisor will ensure that at least one member of the rescue team or service holding a current certification in first aid and CPR is available; and {1910.146(k)(2)(iii)}

4) Ensure that affected employees practice permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, mannequins, or actual persons from the actual permit spaces or from representative permit spaces. Representative permit spaces shall, with respect to opening size, configuration, and accessibility, simulate the types of permit spaces from which rescue is to be performed. {1910.146(k)(2)(iv)}

{J_3} Retrieval Systems….

To facilitate non-entry rescue, Retrieval Systems will be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. The DPP Safety Manager will ensure that Retrieval Systems meet the following requirements:

1) Each authorized entrant will use a chest or full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, or at another point which the DPP Safety Manager or Entry Supervisor can establish presents a profile small enough for the successful removal of the entrant. Wristlets may be used in lieu of the chest or full body harness if the DPP Safety Manager Entry Supervisor can demonstrate that the use of a chest or full body harness is infeasible or creates a greater hazard and the use of wristlets is the safest and most effective alternative. {1910.146(k)(3)(i)}

2) The other end of the retrieval line must be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. A mechanical device will be available to retrieve personnel from vertical type permit spaces more than 5 feet (1.52 m) deep {1910.146(k)(3)(ii)}

{J_4} Injured Employee Exposed to a Hazardous Substance….

If an injured entrant is exposed to a substance for which a Material Safety Data Sheet (MSDS) or other similar written information is required to be kept at the worksite, that MSDS or written information will be made available to the medical facility treating the exposed entrant.

K. Employee Participation

{K_1} Employees Right to Participate in Confined Space Entry Program….

The DPP Safety Manager and Entry Supervisor will:

1) Consult with affected employees and their authorized representatives on the development and implementation of all aspects of the permit space program required by **Section C - Confined Space Program Requirements** of this written program. {1910.146(l)(1)}

2) Make available to affected employees and their authorized representatives all information required to be developed by this written program. {1910.146(l)(2)}

Appendix A Confined Space Entry Permit

Date and Time Issued: _____ Date and Time Expires: _____

Job Site/Space I.D.: _____ Job Supervisor: _____

Equipment/ Work To Be Performed: _____

Occupants: _____ _____ _____

Stand-by Personnel: _____ _____ _____

	N/A	Yes	No
All Occupants and Stand-by Personnel Successfully Completed Required Training?	( )	( )	( )
Is All Training Current?	( )	( )	( )

Atmospheric Checks:

Time _____

Oxygen _____%

Tester's Signature:_____

Explosive _____%L.E.L.

Toxic _____ PPM

Source Isolation (No Entry)

	N/A	Yes	No
Pumps/Lines Blinded, Disconnected, or Blocked:	( )	( )	( )

Ventilation Modification:

	N/A	Yes	No
Mechanical Ventilation:	( )	( )	( )
Natural Ventilation Only:	( )	( )	( )

Atmospheric Check After Isolation and Ventilation:

Oxygen _____% **? > 19.5 %**

Oxygen _____% **? < 23.5 %**

Explosive _____% **L.E.L ? < 10 %**

Toxic _____**PPM ? < 1 PPM H(2)S**

Time: _____

Testers Signature:_____

Communication Procedure: _____

Rescue Procedures: _____

Equipment:

	N/A	Yes	No
Direct Reading Gas Monitor Tested?	( )	( )	( )
Safety Harnesses and Lifelines For All Personnel?	( )	( )	( )
Hoisting Equipment?	( )	( )	( )
SCBA's For Entry and Standby Persons?	( )	( )	( )
Protective Clothing?	( )	( )	( )
All Electric Equipment Listed?	( )	( )	( )
Class I, Division I, Group D and Non-sparking tools?	( )	( )	( )

Periodic Atmospheric Tests:

Oxygen	____%	**Time** ____	**Oxygen**	____%	**Time** ____	**Oxygen** ____%	**Time** ____
Explosive	____%	**Time** ____	**Explosive**	____%	**Time** ____	**Explosive** ____%	**Time** ____
Toxic	____%	**Time** ____	**Toxic**	____%	**Time** ____	**Toxic** ____%	**Time** ____

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: (Entry Supervisor)_____

Approved By: (Entry Supervisor's Superintendent)_____

Reviewed By (Safety Manager): _____

*****This permit to be kept at job site!!!** **3 Copies: (Safety Office) (Unit Supervisor)**

Return job site copy to Safety Office following job completion. **(Job Site)**

CONFINED SPACE ENTRY PERMIT

PERMIT VALID FOR 8 HOURS ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED

DATE:_____ SITE LOCATION and DESCRIPTION _____
PURPOSE OF ENTRY _____
Entry SUPERVISOR(S) in charge of crews Type of Crew Phone #
_____
_____
COMMUNICATION PROCEDURES _____
RESCUE PROCEDURES (PHONE NUMBERS AT BOTTOM) _____
_____
* BOLD DENOTES MINIMUM REQUIREMENTS TO BE COMPLETED AND REVIEWED PRIOR TO ENTRY*

REQUIREMENTS COMPLETED	DATE	TIME
Lock Out/De-energize/Try-out	____	____
Line(s) Broken-Capped-Blanked	____	____
Purge-Flush and Vent	____	____
Ventilation	____	____
Secure Area (Post and Flag)	____	____
Standby Safety Personnel	____	____
Full Body Harness w/"D" ring	____	____
Emergency Escape Retrieval Equip	____	____
Fire Extinguishers	____	____
Lighting (Explosive Proof)	____	____
Protective Clothing	____	____
Respirator(s) (Air Purifying)	____	____
Burning and Welding Permit	____	____

Note: Items that do not apply enter N/A in the blank.

**RECORD CONTINUOUS MONITORING RESULTS EVERY 2 HOURS

CONTINUOUS MONITORING** Permissible _____								
TEST(S) TO BE TAKEN	Entry Level							
PERCENT OF OXYGEN	19.5% to 23.5%	___	___	___	___	___	___	___	___
LOWER FLAMMABLE LIMIT	Under 10%	___	___	___	___	___	___	___	___
CARBON MONOXIDE	+35 PPM	___	___	___	___	___	___	___	___
Aromatic Hydrocarbon	+ 1 PPM * 5PPM	___	___	___	___	___	___	___	___
Hydrogen Sulfide	+10 PPM *15PPM	___	___	___	___	___	___	___	___

REMARKS:_____

GAS TESTER NAME & CHECK #	INSTRUMENT(S) USED	MODEL &/OR TYPE	SERIAL &/OR UNIT #
_____	_____	_____	_____
_____	_____	_____	_____

SAFETY STANDBY PERSON IS REQUIRED FOR ALL CONFINED SPACE WORK

SAFETY STANDBY PERSON(S)	CHECK #	CONFINED SPACE ENTRANT(S)	CHECK #	CONFINED SPACE ENTRANT(S)	CHECK #
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

SUPERVISOR AUTHORIZING - ALL CONDITIONS SATISFIED_____
DEPARTMENT/PHONE _____
AMBULANCE 2800 FIRE 2900 Safety 4901 Gas Coordinator 4529/5387

Appendix B - Definitions

"Acceptable Entry Conditions" means 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.

"Attendant" means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

"Authorized Entrant" means an employee who is authorized by the employer to enter a permit space.

"Blanking or Blinding" means the 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," means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

"Double Block and Bleed" means the 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.

"Emergency" means 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" means the 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" means the action by which a person passes through an opening into a permit-required confined space. Entry includes 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 (Permit)" means the 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 paragraph (f) of this section.

"Entry Supervisor" means the person (such as the employer, foreman, or crew chief) 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 this section.

NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

"Hazardous Atmosphere" means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from 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;

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) 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 Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit;

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

(5) Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

"Hot Work Permit" means the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

"Immediately Dangerous to Life or Health (IDLH)" means 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.

NOTE: Some materials -- hydrogen fluoride gas and cadmium vapor, for example -- may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12-72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.

"Inerting" means the 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.

NOTE: This procedure produces an IDLH oxygen-deficient atmosphere.

"Isolation" means the 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: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

"Line Breaking" means the 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" means a 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" means an atmosphere containing less than 19.5 percent oxygen by volume.

"Oxygen Enriched Atmosphere," means an atmosphere containing more than 23.5 percent oxygen by volume.

"Permit-Required Confined Space (Permit Space)" means a 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; or

(4) Contains any other recognized serious safety or health hazard.

"Permit-Required Confined Space Program (Permit Space Program)" means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

"Permit System" means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

"Prohibited Condition" means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

"Rescue Service" means the personnel designated to rescue employees from permit spaces.

"Retrieval System" means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

"Testing" means the 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.

Appendix C - Atmospheric Testing

(1) Atmospheric Testing is Required for Two Distinct Purposes:

A) Evaluation of the hazards of the permit space and;

B) Verification that acceptable entry conditions exist.

A) Evaluation Testing.

The atmosphere of a confined space will be analyzed using equipment sensitive and specific enough to identify and evaluate any hazardous atmospheres that may exist or arise. This must be done so that acceptable entry conditions can be determined and appropriate permit entry procedures can be developed for that space.

Evaluation and interpretation of this data and development of the entry procedure will be done by the PPD Safety Manager and Entry Supervisor based on their evaluation of all serious hazards.

B) Verification Testing.

The atmosphere of a permit space containing a hazardous atmosphere will be tested for all contaminants identified by the Evaluation Testing done in A) above.

This Verification Testing will be done using permit specified equipment to determine that residual concentrations at the time of testing and entry are within the range of acceptable entry conditions.

Results of testing (i.e., actual concentration, etc.) will be recorded on the permit in the space provided adjacent to the acceptable entry condition.

(2) Duration of Testing:

Air Monitoring for the different air contaminants will be done for at least the minimum response time of the test instrument as specified by the manufacturer.

(3) Testing Stratified Atmospheres:

When monitoring confined space entries that involve entrance into hazardous atmospheres that may be present in different zones within the space, testing will be done a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side.

If a direct reading instrument is used for the monitoring, the entrant shall walk slowly to allow the monitoring instrument to sample the air properly and to allow for proper detector response.

(4) Order of Testing:

A) A test for oxygen will be performed first because most combustible gas meters are oxygen dependent and will not provide reliable readings in an oxygen deficient atmosphere.

B) Combustible gases will be tested for next because the threat of fire or explosion is more immediate and life threatening, in most cases, than exposure to toxic gases and vapors.

C) If tests for toxic gases and vapors are necessary, they will be performed last.

Appendix D - Sewer System Entry and Atmospheric Testing

(1) Sewer Entry Differs in Three Respects From Other Permit Entries:

A) There rarely exists any way to completely isolate the space (a section of a continuous system) to be entered;

B) Because isolation is not complete, the atmosphere may suddenly and unpredictably become lethally hazardous (explosive or toxic) from causes beyond the control of the entrant or employer,

C) Experienced sewer workers are especially knowledgeable in entry and work in their permit spaces because of their frequent entries. Unlike other employments where permit space entry is a rare and exceptional event, sewer workers' usual work environment is a permit space.

(2) Adherence to Procedure:

A) The PPD will designate, as entrants only, employees who are thoroughly trained in the PPD's sewer entry procedures and who demonstrate that they follow these entry procedures exactly as prescribed when performing sewer entries.

(3) Atmospheric Monitoring:

A) Entrants will be trained in the use of, and be equipped with, air monitoring equipment which sounds an audible alarm, in addition to its visual readout, whenever one of the following conditions are encountered:

1) The oxygen concentration is less than 19.5 percent;

2) The explosive gas, dust or vapor level is at 10 percent or more of the lower flammable limit (LFL), or;

3) Hydrogen sulfide at or above 10 ppm at any time.

4) Carbon monoxide at or above 25 ppm at any time.

B) Atmospheric monitoring equipment will be calibrated according to the manufacturer's instructions.

C) The oxygen sensor/broad range hydrocarbon (explosive gas) sensor is best suited for initial use in situations where the actual or potential air contaminants have not been identified.

This is because broad range sensors, unlike substance-specific sensors, enable the Entry Supervisor, attendant and entrant to obtain an overall reading of the hydrocarbons (explosive gases) present in the space.

However, such sensors only indicate that a hazardous level (e.g. explosivity) of a class of chemicals has been exceeded. These broad range sensors do not measure the levels of contamination of specific substances.

D) Therefore, substance-specific devices, which measure the actual levels of specific air contaminants, are best suited for use where actual and potential contaminants have been identified.

The measurements obtained with substance-specific devices are of vital importance to the Entry Supervisor when decisions are made concerning the measures necessary to protect entrants (such as ventilation or personal protective equipment) and the defining of appropriate entry conditions.

E) However, the sewer environment may suddenly and unpredictably change, and the substance-specific devices [used in D) above] may not detect the potentially lethal atmospheric hazards that may enter the sewer environment.

F) Therefore, The oxygen /broad range hydrocarbon (explosive gas) sensor [explained in section C) above] shall continue to be used for monitoring the sewer system while the entrant remains in the space.

* Although OSHA considers the information and guidance provided above to be appropriate and useful in most sewer entry situations, the Agency emphasizes that each employer must consider the unique circumstances, including the predictability of the atmosphere, of the sewer permit spaces in the employer's workplace in preparing for entry. Only the employer can decide, based upon his or her knowledge of, and experience with permit spaces in sewer systems, what the best type of testing instrument may be for any specific entry operation.

G) The selected testing instrument will be carried and used by the entrant in sewer line work to monitor the atmosphere in the entrant's environment, and in advance of the entrant's direction of movement, to warn the entrant of any deterioration in atmospheric conditions. Where several entrants are working together in the same immediate location, one instrument, used by the lead entrant, is acceptable.

(4) Surge Flow and Flooding.

A) Sewer crews will develop and maintain contact, to the extent possible, with the local weather bureau and fire and emergency services in their area so that sewer work may be stopped and entrants withdrawn whenever sewer lines might be suddenly flooded by rain or fire suppression activities, or whenever flammable or other hazardous materials are released into sewers during emergencies by industrial or transportation accidents.

(5) Special Equipment.

A) Entry into large bore sewers may require the use of special equipment. Such equipment might include such items as atmosphere monitoring devices with automatic audible alarms, escape self-contained breathing apparatus (ESCBA) with at least 10 minute air supply (or other NIOSH approved self-rescuer), and waterproof flashlights, and may also include boats and rafts, radios and rope stand-offs for pulling around bends and corners as needed.

Appendix E - Rescue Service Evaluation Criteria

This appendix provides guidance to the Physical Plant Department (PPD) in choosing an appropriate rescue service. It contains criteria that may be used to evaluate the capabilities of rescue teams. OSHA believes that compliance with the Confined Space Standard will enable the PPD to conduct permit space operations without use of rescue services in nearly all cases.

However, experience shows that circumstances will arise where entrants will need to be rescued from permit spaces. It is therefore important for the PPD to select rescue services, either on-site or off-site, which are equipped and capable of minimizing harm to both entrants and rescuers if the need arises.

The PPD's Evaluation of All Rescue Services Will Consist of Two Components:

A) Initial Evaluation:

This evaluation helps the PPD decide whether a potential rescue service is adequately trained and equipped to perform permit space rescues of the kind needed at the facility and whether such rescuers can respond in a timely manner.

For example, based on the initial evaluation, the PPD may determine that maintaining an on-site rescue team will be more expensive than obtaining the services of an off-site team, without being significantly more effective, and decide to hire a rescue service.

B) Performance Evaluation:

In this evaluation the PPD measures the performance of the rescue service during an actual or practice rescue.

During a performance evaluation, the PPD could decide, after observing the rescue service perform a practice rescue, that the service's training or preparedness was not adequate to provide an effective rescue at their facility and decide to select another rescue service, or form an internal rescue team.

A. Initial Evaluation

I) The PPD will meet with the prospective rescue service to facilitate the evaluations required by sections:

{J_1} Rescue and Emergency Services Personnel Evaluation….

{J_2} Duties of PPD Employees Who Provide Rescue and Emergency Services….

Of this Written Confined Space Entry Program.

At a minimum, if an off-site rescue service is being considered, the PPD must contact the service to plan and coordinate the evaluations required by this written program.

*Merely posting the service's number or planning to rely on the 911 emergency phone number to obtain these services at the time of a permit space emergency would not comply with sections {J_1} and {J_2} of this written program.

II) The capabilities required of a rescue service vary depending on the type of spaces and the hazards to be encountered in those spaces from which rescue may be necessary.

Answering the questions below will assist the PPD in determining if the rescue service is capable of performing rescues in the spaces present at the University.

1) What are the needs of the PPD with regard to response time (time for the rescue service to receive notification, arrive at the scene, and set up and be ready for entry)?

   a. For example, if entry is to be made into an IDLH atmosphere, or into a space that can quickly develop an IDLH atmosphere (if ventilation fails or for other reasons), the rescue team or service would need to be standing by at the permit space.

   b. Conversely, if the danger to entrants is restricted to mechanical hazards that would cause injuries (e.g., broken bones, abrasions), a response time of 10 or 15 minutes might be adequate.

2) How quickly can the rescue service get from its location to the permit spaces? Relevant factors to consider would include:

   a. The location of the rescue service relative to the University campus,

   b. The quality of roads and highways to be traveled,

   c. Potential bottlenecks or traffic congestion that might be encountered in transit,

   d. The reliability of the rescuer's vehicles, and

   e. The training and skill of its drivers.

3) What is the availability of the rescue service? Relevant factors to consider would include:

   a. Is it unavailable at certain times of the day or in certain situations?

   b. What is the likelihood that key personnel of the rescue service might be unavailable at times?

   c. If the rescue service becomes unavailable while an entry is underway, does it have the capability of notifying the PPD so that the PPD can instruct the attendant to abort the entry immediately?

4) Does the rescue service meet all the requirements of section {J_2} of this written program? Relevant factors to consider would include:

   a. If not, has it developed a plan that will enable it to meet those requirements in the future?

   b. If so, how soon can the plan be implemented?

5) For off-site services, is the service willing to perform rescues at the PPD's workplace? (An employer may not rely on a rescuer who declines, for whatever reason, to provide rescue services.)

6) Is an adequate method for communications between the attendant, the PPD and prospective rescuer available so that a rescue request can be transmitted to the rescuer without delay?

   a. How soon after notification can a prospective rescuer dispatch a rescue team to the entry site?

7) For rescues into spaces that may pose significant atmospheric hazards and from which rescue entry, patient packaging and retrieval, cannot be safely accomplished in a relatively short time (15-20 minutes), the PPD should consider using airline respirators (with escape bottles) for the rescuers and to supply rescue air to the patient.

   a. If the PPD decides to use SCBA, does the prospective rescue service have an ample supply of replacement cylinders and procedures for rescuers to enter and exit (or be retrieved) well within the SCBA's air supply limits?

8) If the space has a vertical entry over 5 feet in depth, can the prospective rescue service properly perform entry rescues?

   a. Does the service have the technical knowledge and equipment to perform rope work or elevated rescue, if needed?

9) Does the rescue service have the necessary skills in medical evaluation, patient packaging and emergency response?

10) Does the rescue service have the necessary equipment to perform rescues, or must the equipment be provided by the PPD or another source

B. Performance Evaluation

l) Rescue services are required by the PPD Written Confined Space Entry Program to practice rescues at least once every 12 months, provided that the team has not successfully performed a permit space rescue within that time.

As part of each practice session, the service should perform a critique of the practice rescue, or have another qualified party perform the critique, so that deficiencies in procedures, equipment, training, or number of personnel can be identified and corrected.

The results of the critique, and the corrections made to respond to the deficiencies identified, should be given to the PPD Safety Manager to enable them to determine whether the rescue service can quickly be upgraded to meet the employer's rescue needs or whether another service must be selected.

The following questions will assist the PPD and rescue services evaluate their performance:

1) Have all members of the service been trained as permit space entrants, at a minimum, including training in the potential hazards of all permit spaces from which rescue may be needed?

    a. Can team members recognize the signs, symptoms, and consequences of exposure to any hazardous atmospheres that may be present in those permit spaces?

2) Is every team member provided with, and properly trained in, the use and need for PPE, such as SCBA or fall arrest equipment, which may be required to perform permit space rescues in the facility?

    a. Is every team member properly trained to perform their functions and make rescues, and to use any rescue equipment, such as ropes and backboards, that may be needed in a rescue attempt

3) Are team members trained in the first aid and medical skills needed to treat victims injured by the types of hazards that may be encountered in the permit spaces at the University?

4) Do all team members perform their functions safely and efficiently?

    a. Do rescue service personnel focus on their own safety before considering the safety of the victim?

5) If necessary, can the rescue service properly test the atmosphere to determine if it is IDLH?

6) Can the rescue personnel identify information pertinent to the rescue from entry permits, hot work permits, and MSDSs?

7) Has the rescue service been informed of any hazards to personnel that may arise from outside the space, such as those that may be caused by future work near the space?

8) If necessary, can the rescue service properly package and retrieve victims from a permit space that has a limited size opening (less than 24 inches (60.9 cm) in diameter), limited internal space, or internal obstacles or hazards?

9) If necessary, can the rescue service safely perform an elevated (high angle) rescue?

10) Does the rescue service have a plan for each of the kinds of permit space rescue operations at the facility?

11) Is the plan adequate for all types of rescue operations that may be needed at the facility?

12) Teams may practice in representative spaces, or in spaces that are "worst-case" or most restrictive with respect to internal configuration, elevation, and portal size.

13) The following characteristics of a practice space should be considered when deciding if a space is truly representative of an actual permit space:

a. Internal configuration.

(i) Open -- there are no obstacles, barriers, or obstructions within the space. One example is a water tank.

(ii) Obstructed -- the permit space contains some type of obstruction that a rescuer would need to maneuver around.

A) An example would be a baffle or mixing blade.

B) Large equipment, such as a ladder or scaffold, brought into a space for work purposes would be considered an obstruction if the positioning or size of the equipment would make rescue more difficult.

b. Elevation.

(i) Elevated -- a permit space where the entrance portal or opening is above grade by 4 feet or more.

A) This type of space usually requires knowledge of high angle rescue procedures because of the difficulty in packaging and transporting a patient to the ground from the portal.

(ii) Non-elevated -- a permit space with the entrance portal located less than 4 feet above grade.

A) This type of space will allow the rescue team to transport an injured employee normally.

c. Portal size.

(i) Restricted -- A portal of 24 inches or less in the least dimension.

A) Portals of this size are too small to allow a rescuer to simply enter the space while using SCBA.

B) The portal size is also too small to allow normal spinal immobilization of an injured employee.

(ii) Unrestricted -- A portal of greater than 24 inches in the least dimension.

A) These portals allow relatively free movement into and out of the permit space.

d. Space access.

(i) Horizontal -- The portal is located on the side of the permit space.

A) Use of retrieval lines could be difficult.

(ii) Vertical -- The portal is located on the top of the permit space, so that rescuers must climb down, or on the bottom of the permit space, so that rescuers must climb up to enter the space.

A) Vertical portals may require knowledge of rope techniques, or special patient packaging to safely retrieve a downed entrant.

Appendix F – PPD's and Contractor's Responsibilities

A} Physical Plant's Responsibility to Inform Contractors of Hazards

When the PPD arranges to have employees of another employer (Contractor) perform work that involves permit space entry, the PPD will:

1) Inform the Contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of **OSHA's Permit-Required Confined Space Entry Standard, 29 CFR 1910.146**; {1910.146(c)(8)(i)}

2) Apprise the Contractor of the elements, including the hazards identified and the PPD's experience with the space, that make the space in question a permit space; {1910.146(c)(8)(ii)}

3) Apprise the Contractor of any precautions or procedures that the PPD has implemented for the protection of employees in or near permit spaces where Contractor personnel will be working; {1910.146(c)(8)(iii)}

4) Coordinate entry operations with the Contractor, when both PPD personnel and Contractor personnel will be working in or near permit spaces, and {1910.146(c)(8)(iv)}

5) Debrief the Contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations. {1910.146(c)(8)(v)}

B} Contractor's Responsibility When Entering Confined Spaces

In addition to complying with the permit space requirements that apply to all employers, each Contractor who is retained to perform permit space entry operations by the PPD will:

1) Obtain any available information regarding permit space hazards and entry operations from the PPD; {1910.146(c)(9)(i)}

2) Coordinate entry operations with the PPD, when both PPD personnel and Contractor personnel will be working in or near permit spaces; and {1910.146(c)(9)(ii)}

3) Inform the PPD of the permit space program that the Contractor will follow and of any hazards confronted or created in permit spaces during the entry operation. {1910.146(c)(9)(iii)}

Appendix G - Confined Space Ventilation Procedures

1) Any conditions making it unsafe to remove an entrance cover will be eliminated before the cover is removed.

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

3) Before a PPD employee enters the space, the internal atmosphere will be tested, with a calibrated, direct-reading instrument, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order.

4) There must be no hazardous atmosphere within the space whenever any PPD employee is inside the space.

{Use of Continuous Forced Air Ventilation}

5) A PPD employee must not enter the space until the forced air ventilation has eliminated any and all hazardous atmosphere(s);

6) The forced air ventilation will be directed to ventilate the immediate areas where a PPD employee is or will be present within the space and shall continue until all employees have left the space;

7) The air supply for the forced air ventilation will be from a clean source and must not increase the hazards in the space.

8) The atmosphere within the space will be periodically tested as necessary to ensure that the continuous forced air ventilation is preventing a hazardous atmosphere.

{Hazardous Atmosphere Detected During Entry}

9) Each employee will leave the space immediately;

10) The space will be evaluated to determine how the hazardous atmosphere developed;

11) Measures will be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

13) The PPD Supervisor will verify that the space is safe for entry and that the pre-entry measures have been taken, through a written certification that contains the date, the location of the space, and the signature of the person providing the certification. The certification will be made before entry and will be made available to each employee entering the space.

Section II

Specific Program Requirements

A. Confined Space Evaluations

University of Louisville
Confined Space Evaluation

Evaluation Number : 1 **Space:** Sewer System

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
_____ **Non-Permit Required**
__√__ **Permit Required**

Reason for classification: **This space has the potential for atmospheric; physical (slip, trip, and fall) and temperature related hazards.**

This space may also present lighting and communication problems to entrants and attendants.

Procedure for down grading space to Non-Permit Required status:

NOT PERMITTED !!!

There always exist a potential for changing atmospheres and hazards due to sewage and other chemicals continually being introduced into the system.

Description:

The city of Louisville's Metropolitan Sewer District (MSD) sewer system serves all three University campuses. Access is provided to the sewer through cast iron covers (manholes). These manholes can be found in various locations including streets, sidewalks, parking lots, and grass areas. After entering the manhole, the depth to the bottom of the sewer will vary from 4 feet to 20 feet.

Current use of space: To transport sewage from campus buildings to the MSD sewer system. Spaces are also used to allow employee access for cleaning, removing blockages in the system, and for making repairs.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? Yes.

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? Yes.

Source(s) of oxygen deficiency:

Oxygen deficiency may occur due to displacement by gasses i.e., methane and/or hydrogen sulfide, in the sewer system

Oxygen deficiency may also occur due to the consumption of oxygen by rust, if any metal is present, through the curing of concrete, or from microorganisms growing in the space.

Control of oxygen deficiency:

Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? Yes.

Source(s) of oxygen enrichment:

Discharge of a chemical (oxidizer) capable of off-gassing oxygen into the sewer system.

Control of oxygen enrichment: Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen enrichment levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (<23.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned below 23.5% oxygen but are still above 19.5% oxygen. (See oxygen deficiency hazard information)

After reentry, if oxygen levels continue to go above 23.5%, or will not go below 23.5% when ventilating, contact supervisor.

Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere:

Methane and/or hydrogen sulfide may be present from the decomposition of the sewage.

Methane is lighter than air and will collect under the manhole lids and in upper parts of the system.

Hydrogen Sulfide is heavier than air and will collect in the bottom of the sewer.

The discharge of explosive liquids from labs and other areas can also generate explosive atmospheres in the sewer system.

Control of an explosive atmosphere:

After opening the manhole, and prior to entry into the system, the atmosphere shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **Yes.**

Toxin: 1) Hydrogen sulfide

Source(s) of toxin:

1) Hydrogen Sulfide may leak into the space from the decomposition of sewage.

Control of toxin:

Prior to entry into the sewer, the atmosphere inside is to be tested for hydrogen sulfide with a hydrogen sulfide meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for hydrogen sulfide. This must continue until the entrant has left the space.

If hydrogen sulfide readings above 0.5 ppm are detected, the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Because of the danger associated with hydrogen sulfide exposure, employees cannot reenter space until hydrogen sulfide meter reads 0.0 ppm!!!

After reentry, if hydrogen sulfide readings continue to rise above 0.5 ppm, 0.0 ppm when ventilating, contact supervisor.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Water from building.	Shut down water to building.	Test faucets in building.

Means of Access Into and Egress from Space:

Access into the space will be through a manhole cover. The space will contain a fixed ladder or employees may have to place a ladder in the space for entry into the sewer system.

For entry into spaces greater than five (5) feet deep, the use of a tripod, equipped with a fall arresting retrieval winch, is required.

Means to prevent unauthorized entry:

All manholes have lids that are extremely heavy and require tools to open.

All maintenance employees are to receive training to inform them that entry into sewer manholes is not permitted without following appropriate procedure!

Entry and retrieval equipment:

The following equipment will be set up and ready for use at the manhole prior to entry into a space greater than five (5) feet in depth:

1. Full body harness, on each entrant;
2. Tripod and/or other retrieval anchorage rated for human beings;
3. Ladder or positioning winch with non-conducting retrieval line; and
4. Fall arrest retrieval winch with retrieval line.

The following equipment will be at the manhole prior to entry into a space less than five (5) feet in depth:

1. A full body harness, on each entrant.

Personal Protective Equipment: (other than what is normally worn)

For entrants;

1. Tyvek suit;
2. Gloves;
3. Flashlight;
4. Hard hat;
5. Dust mask (personal preference for comfort).

For attendants; If attendants will be sliding the cable or rope of the retrieval system through their hands, they shall wear leather gloves.

Special equipment required:

If additional lighting is needed to perform work in the sewer, explosion proof lighting shall be used.

Rescue procedure:

Whenever a space is entered with the tripod or other retrieval equipment, the entrant shall remain attached to the system.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance then hoist the entrant out of the space. Under no circumstance shall employees attempt to rescue the occupant in the space!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 2 **Space:** Sewage Ejector Pump Basins

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ Restricted Access
_____ Non-Permit Required
___√___ Permit Required

Reason for classification: **This space has the potential for atmospheric, electrical and mechanical hazards.**

Procedure for down grading space to Non-Permit Required status:

NOT PERMITTED !!!

There will always be the possibility of sewage in the bottom of these basins!!!

Description:
Sewage ejector pump basins are located in the sewer system and also in building mechanical rooms on all three University campuses. Some of these basins are large enough to bodily enter. Access is provided to the basins through metal or plastic covers. After entering the sewage ejector basin, the depth to the bottom of the basin will vary from 12 feet to 45 feet.

Current use of space: These basins house the components of the sewage ejector pumps. The space also allows employees access to perform maintenance on the sewage ejector pumps.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency: Oxygen deficiency may occur due to the consumption of oxygen by rust, if any metal is present, through the curing of concrete, or from microorganisms growing in the space.

Oxygen deficiency may also occur from the displacement of oxygen by sewer gasses i.e., methane and/or hydrogen sulfide gas.

Control of oxygen deficiency: Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? Yes.

Source(s) of oxygen enrichment: Discharge of a chemical (oxidizer) capable of off-gassing oxygen into the sewage ejector pump basin.

Control of oxygen enrichment: Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (<23.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned below 23.5% oxygen but are still above 19.5% oxygen. (See oxygen deficiency hazard information)

After reentry, if oxygen levels continue to go above 23.5%, or will not go below 23.5% when ventilating, contact supervisor.

Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere: Methane and/or hydrogen sulfide may be present from the decomposition of the sewage.

Methane is lighter than air and will collect under the basin lids and in upper parts of the system.

Hydrogen Sulfide is heavier than air and will collect in the bottom of the sewage ejector pump basin.

The discharge of explosive liquids from labs and other areas can also generate explosive atmospheres in the sewage ejector pump basin.

Control of an explosive atmosphere: After opening the basin, and prior to entry into the basin, the atmosphere shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **Yes.**

Toxin: Hydrogen sulfide

Source(s) of toxin: Hydrogen Sulfide may leak into the space from the decomposition of sewage.

Control of toxin: Prior to entry into the sewage pump ejector basin, the atmosphere inside is to be tested for hydrogen sulfide with a hydrogen sulfide meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry

made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for hydrogen sulfide. This must continue until the entrant has left the space.

If hydrogen sulfide readings above 0.5 ppm are detected, the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Because of the danger associated with hydrogen sulfide exposure, employees cannot reenter space until hydrogen sulfide meter reads 0.0 ppm!!!

After reentry, if hydrogen sulfide readings continue to rise above 0.5 ppm, 0.0 ppm when ventilating, contact supervisor.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Electricity to power motors, pumps and compressors.	**Perform lockout/tagout on the electrical disconnect.**	**Attempt to start motor, pump or compressor.**
Hydraulic (sewage).	**Close inlet, discharge valves, perform lockout/tagout.**	**Visual.**

Means of Access Into and Egress From Space: Through metal and plastic lids on top of the basins.

For entry into spaces greater than five (5) feet deep, the use of a tripod, equipped with a fall arresting retrieval winch, is required.

Means to prevent unauthorized entry: Mechanical rooms are kept locked.

All maintenance employees are to receive training to inform them that entry into sewage ejector pump basins is not permitted without following appropriate procedures!

Entry and retrieval equipment:

The following equipment will be set up and ready for use at the sewage ejector pump basin prior to entry into a space greater than five (5) feet in depth:

5. Full body harness, on each entrant;
6. Tripod and/or other retrieval anchorage rated for human beings;

7. Ladder or positioning winch with retrieval line; and
8. Fall arrest retrieval winch with retrieval line.

The following equipment will be at the sewage ejector pump basin prior to entry into a space less than five (5) feet in depth:

2. A full body harness, on each entrant.

Personal Protective Equipment: (other than what is normally worn):

For entrants;

6. Tyvek suit;
7. Gloves;
8. Flashlight;
9. Hard hat;
10. Dust mask (personal preference for comfort).

For attendants; If attendants will be sliding the cable or rope of the retrieval system through their hands, they shall wear leather gloves.

Special equipment required: If additional lighting is needed to perform work in a sewage ejector pump basin, explosion proof lighting shall be used.

Rescue Procedure:

Whenever a space is entered with the tripod or other retrieval equipment, the entrant shall remain attached to the system.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance then hoist the entrant out of the space.

Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 3 **Space:** Coal Bunker

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation Date: 02/02/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
_____ **Non-Permit Required**
__√__ **Permit Required**

Reason for classification: **This space has the potential for engulfment and explosive atmosphere hazards.**

Procedure for down grading space to Non-Permit Required status:

NOT PERMITTED!!!

Coal Bunker will always need to be entered when coal is in the bunker!!!

Description:

The Coal Bunker is located in the Steam and Chill Water Plant between the coal-fired and gas-fired boilers.

Current use of space: To store coal for use in the boiler fireboxes.

Previous use of space: Same as the current use.

*****Under no circumstances are Steam and Chill employees to enter the Coal Bunker when the coal fired boilers are running and the coal is moving out of the Coal Bunker and into the fire boxes.**

Potential for Atmospheric Hazard: **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential: (less than 19.5%) **No.**

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential: (greater than 23.5%) **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

*****Under no circumstances are Steam and Chill employees to enter the Coal Bunker when the coal fired boilers are running and the coal is moving out of the Coal Bunker and into the fire boxes.**

Explosive Atmosphere Potential: (> than 10% of LEL) **Yes.**

Source(s) of an explosive atmosphere: Coal dust.

Coal Dust will be generated in the Coal Bunker by normal operation of the conveyor belt bringing coal into the bunker, coal moving through the coal bunker and into the fireboxes and employees walking on and working the coal to move it in to the fireboxes.

After entry into the Coal Bunker room and prior to entry into the Coal Bunker system, the atmosphere in the room shall be tested for explosive dust content with an explosive dust meter that has been calibrated in accordance with the manufacturer's instructions.
The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

A general rule of thumb is that any concentration of dust that you cannot see approximately five feet through is above the LEL.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive dust readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive dust readings have returned below 5% of the LEL

After reentry, if explosive dust readings continue to rise above 10 % of the LEL, or will not go below 5% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential: **Yes.**

Toxin: Coal Dust

Source(s) of toxin: Coal Dust will be generated in the Coal Bunker by normal operation of the conveyor belt bringing coal into the bunker, coal moving through the coal bunker and into the fireboxes and employees walking on and working the coal to move it in to the fireboxes. Breathing coal dust can cause respiratory problems.

Control of toxin: Employees should wear double strap dust mask respirators when working in the Coal Bunker. They must also wear a full body harness and be tied off with two other employees working as attendants to pull the entrant out of the space if necessary.

Potential for Hazardous Energy: **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Track Tripper	**Disconnect at Motor Control Center.**	**Try to activate. Visual inspection.**

Means of Access Into and Egress from Space: The Coal Bunker is an open top space. Entry into and out of the space is by a ladder through the top opening.

Means to prevent unauthorized entry: The Steam and Chill Water Plant is staffed at all times.

Entry and retrieval equipment: The following equipment will be set up and ready for use at the coal bunker prior to entry:

9. Full body harness, on each entrant;
10. Tripod and/or other retrieval anchorage rated for human beings;
11. Ladder or positioning winch with retrieval line; and
12. Fall arrest retrieval winch with retrieval line.

Personal Protective Equipment: (other than what is normally worn)

For entrants;

11. Tyvek suit;
12. Gloves;
13. Flashlight;
14. Hard hat;
15. Dust mask (personal preference for comfort).

For attendants;

If attendants will be sliding the cable or rope of the retrieval system through their hands, they shall wear leather gloves.

Special equipment required: None required.

Rescue Procedure: Whenever a space is entered with the tripod or other retrieval equipment, the entrant shall remain attached to the system.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance then hoist the entrant out of the space.

Under no circumstance shall employees enter the space to attempt to rescue the occupant in the space!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 4 **Space:** Electrical Vaults (Energized)

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access Only**
_____ **Non-Permit Required**
__√__ **Permit Required**

Reason for classification: **This space has the potential for hazardous atmospheres and electrical hazards. This space also has the potential for slipping and tripping hazards due to water and/or leaves, mud, sludge, etc. in the bottom of the vaults after it rains.**

Procedure for down grading space to Non-Permit Required status:

NOT PERMITTED !!!

***** Components in this space will remain energized while employees work in the space.

Description:
Underground electrical vaults are located throughout the University campus. They can be found in various locations including streets, sidewalks, parking lots, and grass areas. Access is provided to the vaults through cast iron doors or covers (manholes). After entering the vault, the depth to the bottom of the vault will vary from 8 feet to 12 feet.

Current use of space: This space houses the components of the electrical distribution system, which runs throughout campus. The vaults allow employees access to perform maintenance and add new components to the electrical distribution system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.
Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:

Oxygen deficiency may occur due to the consumption of oxygen by rust, if any metal is present, through the curing of concrete, or from microorganisms growing in the space.

Control of oxygen deficiency:

Prior to entry into the vault the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not Applicable.

Control of oxygen enrichment: Not Applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere:

Methane from leaking gas lines, other explosive vapors, from surface spillage or prior ground contamination, could migrate into the vaults.

Control of an explosive atmosphere:

After opening the vault, and prior to entry into the vault, the atmosphere shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left

the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **Yes.**

Toxin: Electricians could use products such as a Propane Torch, 3M Lubricant, Heat Shrink Wrap and a CC2 kit.

See product ingredients and check product MSD sheets to identify specific toxins and precautions to take!

Source(s) of toxin: Electricians could use products such as a Propane Torch, 3M Lubricant, Heat Shrink Wrap and a CC2 kit.

Control of toxin: Do not use these products without proper ventilation in the space.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
High Voltage	**Insulation of lines** **(Also see PPE Section on next page!!!)**	**Visual check**

Means of Access Into and Egress From Space:

Access into the space will be through cast iron doors or a manhole cover. The space will contain a fixed ladder or employees may have to place a ladder in the space for entry into the vault.

For entry into spaces greater than five (5) feet deep, the use of a tripod, equipped with a fall arresting retrieval winch, will be required.

Means to prevent unauthorized entry:

All vaults have heavy cast iron doors or lids that are extremely heavy and require special tools to

open.

All maintenance employees are to receive training to inform them that entry into energized electrical vaults is not permitted without following appropriate procedure!

Entry and retrieval equipment:

The following equipment will be set up and ready for use at the manhole prior to entry into a space greater than five (5) feet in depth:

13. Full body harness, designed for electrical work, on each entrant;
14. Tripod and/or other retrieval anchorage rated for human beings;
15. Ladder or positioning winch with non-conducting retrieval line; and
16. Fall arrest retrieval winch with non-conducting retrieval line.

The following equipment will be at the manhole prior to entry into a space less than five (5) feet in depth:

1. A full body harness, designed for electrical work, on each entrant.

Personal Protective Equipment (other than what is normally worn):

For entrants;

16. High voltage gloves;
17. High voltage sleeves;
18. Fire resistant clothing; **(Do not wear polyester or plastic/petroleum based clothing!!!) (Wear natural fiber clothing, such as cotton, only!!!)**
19. Smith Arc Hood; and
20. Non-conducting electrical boots.

For attendants;

If attendants will be sliding the cable or rope of the retrieval system through their hands, they shall wear leather gloves.

Special equipment required: None Required.

Rescue Procedure: Whenever a space is entered with the tripod or other retrieval equipment, the entrant shall remain attached to the system.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance then hoist the entrant out of the space. Under no circumstance shall employees enter the space to attempt to rescue the occupant in the space!!

Evaluation Number : 5 **Space:** PIV/Water Meter Vaults

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
_____ **Non-Permit Required**
__√__ **Permit Required**

Reason for classification: **This space has the potential for hazardous atmospheres and engulfment in water should a water line fail while vault is occupied.**

There are two PIV/Water Meter Vaults, one at the Football Stadium and one at the Physical Plant Garage/Grounds Shop, which are especially dangerous because they are 6 and 8 feet deep respectively.

All the other PIV/Water Meter Vaults on Belknap Campus are 3 to 4 feet deep where employees could simple stand up in the space and they would not be in danger of water engulfment.

Procedure for down grading space to Non-Permit Required status:
NOT PERMITTED!!!

*** The water mains running through these vaults cannot usually be shut down when employees need to enter space.**

Description: Underground water system vaults are located throughout the University campus. They can be found in various locations including streets, sidewalks, parking lots and grass areas. Access is provided through the vault doors. After passing through the vault doors, the depth to the bottom of the vault will vary from 3 feet to 8 feet deep.

Current use of space: The vaults currently house components of the water distribution and fire protection systems. The space also allows employee access for maintenance to the components of the systems.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? Yes.

Source(s) of oxygen deficiency:
Oxygen deficiency may occur from the consumption of oxygen by rust, if any metal is present, through the curing of concrete, or from microorganisms growing in the space.

Control of oxygen deficiency:
Prior to entry into the vault, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? No.

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? Yes.

Source(s) of an explosive atmosphere:
Methane from leaking gas lines, other explosive vapors, from surface spillage or prior ground contamination, could migrate into the vaults.

Methane is lighter than air and will collect under the basin lids and in upper parts of the system.

Control of an explosive atmosphere:
After opening the vault, and prior to entry into the vault, the atmosphere shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in

accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **No.**

Toxin: Not Applicable

Source(s) of toxin: Not Applicable

Control of toxin: Not Applicable

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Water	**When possible, shut off water valves and LO/TO valves.**	**Visual Inspection and try to turn on valve.**

Means of Access Into and Egress from Space:

Access into the space will be through the vault doors. The space will contain a fixed ladder or employees may have to place a ladder in the space for entry into the vault.

For entry into spaces greater than five (5) feet deep, the use of a tripod or davit arm, equipped with a fall arresting retrieval winch, will be required.

Means to prevent unauthorized entry: All PIV/water meter vaults have doors that are locked and require secured keys to open.

All maintenance employees are to receive training to inform them that entry into the PIV/water meter vaults is not permitted without following appropriate procedure!

Entry and retrieval equipment: The following equipment will be set up and ready for use at the vault prior to entry into a space greater than five (5) feet in depth:

17. Full body harness, on each entrant;
18. Tripod and/or other retrieval anchorage rated for human beings;
19. Ladder or positioning winch with retrieval line; and
20. Fall arrest retrieval winch with retrieval line.

The following equipment will be at the manhole prior to entry into a space less than five (5) feet in depth:

1. A full body harness, on each entrant.

Personal Protective Equipment (other than what is normally worn)**:**

For entrants;
21. Waterproof boots or waders;
22. Gloves;

For attendants; If attendants will be sliding the cable or rope of the retrieval system through their hands, they shall wear leather gloves.

Special equipment required: None.

Rescue Procedure: Whenever a space is entered with the tripod or other retrieval equipment, the entrant shall remain attached to the system.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance and then hoist the entrant out of the space.

Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Evaluation Number: 6 **Space:** Ash Silo

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation Date: 02/01/08

Prepared by: James Burchfield **Title:** Safety Manager

Classification:

_____ Restricted Access
_____ Non-Permit Required
___√___ Permit Required

Reason for classification: **This space has the potential for mechanical and engulfment hazards.**

Procedure for down grading space to Non-Permit Required status:

NOT PERMITTED !!!
There always exist an engulfment potential for employees that must enter the Ash Silo when there is more than 2 foot of ash in the Silo.

Description:

As part of the boiler system the ash silo is 67 feet tall and 10 ft in diameter. The ash silo receives ash from the coal-fired boilers. The ash is transported to the silo by vacuum lines from both coal fire boilers.

Current use of space: To store ash until it is removed for disposal.

Previous use of space: Same as the current use.

*** 1) Employee must wear confined space entry harness and remain attached to lanyard from hoist at all times while in the ash silo when the silo contains over 2 foot of ash.

2) Proper supports to stand on to prevent sinking and engulfment in ash.

Potential for Atmospheric Hazard? **No.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 20%)? No.

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 22%)? No.

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? No.

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? No.

Toxin: Not Applicable. **Source(s) of toxin:** Not Applicable.

Control of toxin: Not Applicable.

*** 1) Employee must wear confined space entry harness and remain attached to lanyard from hoist at all times while in the ash silo when the silo contains over 2 foot of ash.

2) Proper supports to stand on to prevent sinking and engulfment in ash.

Potential for Hazardous Energy? Yes.

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Rotary unloader	**MCC lock**	**Attempt to start.**
Air Actuated Valve	**LO/TO valve**	**Attempt to start**

Means of Access Into and Egress from Space: Access into the space will be through a hatch on the top of the silo.

Means to prevent unauthorized entry: Hatches are secured requiring tools to open during normal operations.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as "Restricted Access."

Personal Protective Equipment: (other than what is normally worn)
Employees may want to wear knee pads and gloves if crawling. Employees may also need to wear double strap disposable dust mask because of nuisance fly ash.

Special equipment required:
1) Employee must wear confined space entry harness and remain attached to lanyard from hoist at all times while in the ash silo when the silo contains over 2 foot of ash.

2) Proper supports to stand on to prevent sinking and engulfment in ash.

Rescue Procedure: When a Permit Required Space is entered, a second employee will remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance.

Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 7 **Space:** Communication Vaults

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for a hazardous atmospheres and Electrical Hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Status:

1. After atmospheric testing demonstrates that oxygen and air contaminant readings are at acceptable levels, and;
2. After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed, and;
3. After ensuring that employees will not be working on the Energy Management Department's "Honeywell System Line" or "Delta Line" while the line is "hot" or that employees will not breech the "Honeywell System Line" or "Delta Line" while performing other work or operations in the space.

* Down grading to Non-Permit Required Status is not permitted when "hot work" is being performed in the space.

Description: Underground communication system vaults are located throughout the University. They are found in various locations including streets, sidewalks, parking lots and grass areas. Access is provided through cast iron doors or covers (manholes). After entering the vault, the depth to the bottom of the vault will vary from 8 feet to 12 feet.

Current use of space: To allow employee access for maintenance to the communication and electrical cables which run between campus buildings. The space is also used to allow new and/or additional cables to be added to the system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:
Oxygen deficiency may also occur due to the consumption of oxygen by rust, if any metal is present, through the curing of concrete, or from microorganisms growing in the space.

Control of oxygen deficiency:
Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**
Source(s) of oxygen enrichment: Not Applicable.
Control of oxygen enrichment: Not Applicable.
Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere: Methane from leaking gas lines, other explosive vapors, from surface spillage or prior ground contamination, could migrate into the vaults.

Control of an explosive atmosphere: After opening the vault doors or manhole, and prior to entry into the system, the atmosphere shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **Yes.**

Toxin: Electricians could use products such as a Propane Torch, 3M Lubricant, Heat Shrink Wrap and a CC2 kit.

See product ingredients and check product MSD sheets to identify specific toxins and precautions to take!

Source(s) of toxin: Electricians could use products such as a Propane Torch, 3M Lubricant, Heat Shrink Wrap and a CC2 kit.

Control of toxin: Do not use these products without proper ventilation in the space.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
"Honeywell Line" is a source of DC voltage	**Ensure line is insulated.** *****If working on line, space must be entered as Permit Required Space.**	**Visual, testing with voltmeter.**

Means of Access Into and Egress From Space: Access into the space will be through the vault doors or manhole cover. The space will contain a fixed ladder or employees may have to place a ladder in the space for entry into the vault.

Means to prevent unauthorized entry: All vault doors and manhole covers have lids that are heavy and require tools to open.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required.

Personal Protective Equipment (other than what is normally worn)**:**
Gloves and eye protection if needed.

Special equipment required: None Required.

Rescue Procedure: Whenever a Non-Permit Required space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 8 **Space:** Water Tank

Campus: Belknap – Henry Vogt Bldg. **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
___√ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential to develop an oxygen deficient atmosphere during use and/or after draining for service and/or repairs.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

1) After the boiler is shut down and equipment has had a chance to cool.
2) After application and verification of Lockout/Tagout (LO/TO) procedures for water valves emptying into tank.
3) After atmospheric testing demonstrates that oxygen readings are at acceptable levels.
4) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

* Downgrading to Non-Permit Required Access Status is not permitted when “hot work” is being performed in the space.

Description:

This water tank is located in the basement mechanical room of the Henry Vogt building and is large enough to bodily enter (6 feet wide by 12 feet long). This tank contains water and will be drained prior to service, cleaning and/or repairs. Entry may be required to perform these operations.

Current use of space: To recover and store cooling tower water.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:
This water tank is constructed of steel. Normal operation of the tank may cause the tank to rust. The tank may also rust after draining and prior to entry. This may use up the oxygen in the space.

Control of oxygen deficiency:
The water tank shall be emptied and vacuumed as dry as possible. The tank shall then be ventilated to dry up remaining water and to prevent the tank from going oxygen deficient.

Prior to entry into the tank, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? No.

Toxin: Not applicable. **Source(s) of toxin:** Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? Yes.

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Hydraulic (water)	Close and lockout/tagout valves.	Visual check. Try and operate valves.

Means of Access Into and Egress from Space: Access into space will be through a 16 by 16-inch hatch opening in the side of the tank.

Means to prevent unauthorized entry: Hatch is bolted shut.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment (other than what is normally worn)**:** None required.

Special equipment required: None required.

Rescue Procedure: When a Non-Permit space is entered, a second employee will remain outside the space and stay in contact with occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Confined Space Evaluation

Evaluation Number: 9 **Space:** Flash Tank

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation Date: 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for atmospheric and physical hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

5) After the plant is shut down and equipment has had a chance to cool.
6) After application and verification of Lockout/Tagout (LO/TO) procedures for water valves emptying into the tank.
7) After atmospheric testing demonstrates that oxygen readings are at acceptable levels.
8) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

*Down grading to Non-Permit Required Access Status is not permitted when "hot work" is being performed in the space.

Description: Part of the boiler system, this steel "flash tank" is located on the first floor behind the boilers. This tank is 3 feet in diameter and 5 feet tall.

Current use of space:
This steel "flash tank" is used to cool the boiler blowdown water. The water condenses to settling pits before it goes into the sewer system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? Yes.

Source(s) of oxygen deficiency:
Oxygen deficiency may also occur in the flash tank due to rusting of the tank between the time the system is taken off line and prior to employee entry.

Control of oxygen deficiency:
Prior to entry into the "flash tank", the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (> than 23.5%)? No.

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? No.

Source(s) of explosive atmosphere: Not applicable.

Control of explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? No.

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? Yes.

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Water	**Follow existing shutdown procedures.**	**Try to operate system. Visual inspection of tank for water.**

Means of Access Into and Egress from Space:
Access into the space will be through a 14-inch by 16-inch manway opening.

Means to prevent unauthorized entry:
Hatches are secured requiring tools to open during normal operations.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn.) None required.
Special equipment required: None.

Rescue Procedure: When a Non-Permit Required space is entered, a second employee will remain outside the space and stay in contact with occupant by sight, voice, radio, etc.

In an emergency, the attendant will contact Public Safety at (6111) for assistance. Under no circumstance will employees attempt to rescue the occupant in the space!!!

Confined Space Evaluation

Evaluation Number: **10** **Space:** **Steam & Mud Drums**

Campus: **Belknap – Steam & Chill Water Plant**

Re-evaluation Date: **02/01/08**

Prepared By: **James Burchfield** **Title:** **Safety Manager**

Classification:

_____ **Restricted Access**
___√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for atmospheric and physical hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

9) After the plant is shut down and equipment has had a chance to cool.
10) After verification that boiler shut down procedures have been implemented.
11) After atmospheric testing demonstrates that oxygen readings are at acceptable levels.
12) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

*Down grading to Non-Permit Required Status is not permitted when "hot work" is being performed in the space.

Description: Part of the boiler system, these steel drums are used where steam is produced, cooled and vented.

Current use of space: Mud and solids settle into these drums.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency: From rusting of the system after the system is taken off-line and prior to entry.

Control of oxygen deficiency: Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After entering the space, the attendant must remain in contact with entrant and monitor the space for oxygen levels. This must continue until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential(> than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **No.**

Toxin: Not applicable. **Source(s) of toxin:** Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Steam from boiler.	Shut down and cooling of boiler.	Follow boiler shutdown procedures.

Means of Access Into and Egress from Space: Through 2 hatches located on each side of the steam and mud drums.

Means to prevent unauthorized entry: Hatches are secured requiring tools to open during normal operations.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn) None required.

Special equipment required: None.

Rescue Procedure: When a Non-Permit space is entered, a second employee will stay outside the space and stay in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Evaluation Number: 11 **Space:** De-Aeration Tank

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation Date: 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for atmospheric and physical hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

13) After the plant is shut down and equipment has had a chance to cool.
14) After application and verification of Lockout/Tagout (LO/TO) procedures for specific equipment.
15) After atmospheric testing demonstrates that oxygen readings are at acceptable levels.
16) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

* Down grading to Non-Permit Required Access Status is not permitted when "hot work" is being performed in the space.

Description: Part of the boiler system, this steel "de-aeration tank" is located on the 2nd level, East Side of the boiler. The tank is 5 feet in diameter and 20 feet tall.

Current use of space: This "de-aeration tank" is used to preheat and store water for the boiler system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:
Oxygen deficiency may also occur in the flash tank due to rusting of the tank between the time the system is taken off line and prior to employee entry.

Control of oxygen deficiency:
Prior to entry into the "de-aeration tank", the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **No.**

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Water	Follow existing shutdown procedures.	Try to operate system. Visual inspection of tank for water.

Means of Access Into and Egress from Space: Access into space will be through an 11 by 15-inch elliptical opening on side of the tank.

Means to prevent unauthorized entry: Hatches are secured requiring tools to open.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn) None required.

Special equipment required: None.

Rescue Procedure: Whenever a Non-Permit Required space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Evaluation Number: 12 **Space:** Elevator Pits

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for atmospheric, mechanical and physical hazards.**

Procedure for down grading space to Non-Permit Required Status:
This space may be reclassified as Non-Permit Required Access:

1. **After application and verification of Lockout/Tagout (LO/TO) procedures for specific equipment.**
2. **After atmospheric testing demonstrates that oxygen and air contaminant readings are at acceptable levels.**
3. **After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.**

Downgrading to Non-Permit Required Access Status is not permitted if any "hot work" is to be performed in the space.

Description: Buildings throughout the University community contain elevators with pits at the bottom of the elevator shaft. Employees must enter these elevator pits to make repairs to the elevator equipment. After passing through the elevator doors, the depth to the bottom of the pit will vary from 4 feet to 6 feet.

Current use of space: To house elevator equipment and allow access for employees to make repairs.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:

Oxygen deficiency may occur due to the displacement of oxygen by an accumulation of gases that have migrated into the pit or have backed-up through the floor drain (if present).

Control of oxygen deficiency:

Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere:

Explosive vapors, from surface spillage or prior ground contamination, could migrate into the vaults.

Methane and Hydrogen Sulfide backing up from the sewer through a dry floor drain trap.

Methane is lighter than air and will collect in upper parts of the system.

Hydrogen Sulfide is heavier than air and will collect in the bottom of the pit.

Control of an explosive atmosphere:

Prior to entry into the pit, the atmosphere inside shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential: **Yes.**

Toxin: **Hydrogen Sulfide**

Source(s) of toxin: Sewer gas backing-up through a dry trap in the Elevator Pit floor drain.

Control of toxin: Prior to entry into the pit, the atmosphere inside is to be tested for hydrogen sulfide with a hydrogen sulfide meter that has been calibrated in accordance with the manufacture's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for hydrogen sulfide. This must continue until the entrant has left the space.

If hydrogen sulfide readings above 0.5 ppm are detected, the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Because of the danger associated with hydrogen sulfide exposure, employees cannot reenter space until hydrogen sulfide meter reads 0.0 ppm!!!

After reentry, if hydrogen sulfide readings continue to rise above 0.5 ppm, 0.0 ppm when ventilating, contact supervisor.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Elevator	**Operate elevator "stop" switch.**	**Visual**

Means of Access Into and Egress from Space: The space will contain a fixed ladder or employees may have to place a ladder in the space for entry into the vault.

Means to prevent unauthorized entry: When the elevator is in normal operation, the elevator prevents access to the pit.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn)
Gloves and/or eye protection if needed.

Special equipment required: Low voltage lighting if needed.

Rescue Procedure: Whenever a Non-Permit Required Access space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Evaluation Number: 13 **Space:** Morrison Tube Boilers

Campus: Belknap, University Tower Apartments, Ernst Hall, Life Sciences and Urban Studies Institute (The Old Standard Oil Building)

Re-evaluation Date: 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ Restricted Access
___√_ Non-Permit Required
_____ Permit Required

Reason for classification: This space has the potential for atmospheric and physical hazards.

Procedure for down grading space to Non-Permit Required status:
This space may be reclassified as Non-Permit Required Access:

1. After the boiler is shut down and equipment has had a chance to cool.
2. After application and verification of Lockout/Tagout (LO/TO) procedures for specific equipment.
3. After atmospheric testing demonstrates that oxygen and air contaminant readings are at acceptable levels.
4. After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

* Down grading to Non-Permit Required Access Status is not permitted when "hot work" is being performed in the space.

Description:
A gas-fired boiler, located in the basement of these buildings, provides the occupants of these buildings with hot water and steam for heat.

Current use of space: The boiler is used to heat water and make steam for the building's heating system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? Yes.

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:

Oxygen deficiency may occur due to displacement by a natural gas leak into the fire box after shut down.

Oxygen deficiency may occur due to the consumption of oxygen from the rusting of tubes after shut down and prior to entry.

Control of oxygen deficiency:

Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere:

An explosive atmosphere may occur from a leak in the natural gas system that feeds the boiler's firebox.

Control of an explosive atmosphere:

Employees shall isolate and lockout/tagout (LO/TO) the gas valves to the boiler. After opening the firebox, and prior to entry into the boiler, the atmosphere shall be tested for explosive vapor

content with a multi-gas explosion meter that has been calibrated in accordance with the manufacture's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? No.

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? Yes.

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Natural Gas	**Close and LO/TO gas valve.**	**Try to turn on gas valve.**
Electricity	**Turn off and LO/TO the switch.**	**Try to turn electricity back on.**
Shut down main steam valve.	**Close and LO/TO steam valve.**	**Try to turn valve on.**
Close water supply valve.	**Close and LO/TO water valve.**	**Try to turn water valve on.**

Means of Access Into and Egress From Space: Through doors or hatches on the boiler.

Means to prevent unauthorized entry: Boiler is located in a lockable mechanical room. Hatches are bolted shut.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment (other than what is normally worn):
Hard hat, gloves, goggles or safety glasses if needed.

Special equipment required: None Required.

Rescue Procedure: When a Non-Permit space is entered, a second employee will remain outside the space and in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Evaluation Number: 14 **Space:** Electrical Vaults (De-energized)

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ Restricted Access
__√__ Non-Permit Required
_____ Permit Required

Reason For classification: **This space has the potential for electrical and atmospheric hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

1. After Lockout/Tagout procedures are performed on electrical lines and components in the space.
2. After conducting oxygen and atmospheric testing.
3. If tests are within acceptable limits, space is considered Restricted Access.
4. If space is not within acceptable limits, ventilate and re-test.
5. If space remains above limits, contact Superintendent.

*Down grading to Non-Permit Required Access Status is not permitted when "hot work" is being performed in the space!!!

Description: Underground electrical vaults are located throughout campus. They can be found in various areas including streets, sidewalks, parking lots, and grass areas. Access is provided to the vaults through cast iron doors and covers (manholes). The depth to the bottom of the vault will vary from 8 feet to 12 feet.

Current use of space: This space houses the components of the electrical distribution system that runs throughout campus. The vaults allow employees access to perform maintenance and add new components to the electrical distribution system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:
Oxygen deficiency may occur due to the consumption of oxygen by rust, if any metal is present, through the curing of concrete, or by microorganisms growing in the space.

Control of oxygen deficiency:
Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, with further testing to be done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **Yes.**

Source(s) of an explosive atmosphere:
Methane from leaking gas lines, other explosive vapors, from surface spillage or ground contamination, could migrate into the vaults.

Control of an explosive atmosphere:

After opening the vault, and prior to entry into the system, the atmosphere shall be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacture's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for an explosive atmosphere. This must continue until the entrant has left the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **Yes.**

Toxin: Electricians could use products such as a Propane Torch, 3M Lubricant, Heat Shrink Wrap and a CC2 kit. See product ingredients and check product MSD sheets to identify specific toxins and precautions to take!

Source(s) of toxin: Electricians could use products such as a Propane Torch, 3M Lubricant, Heat Shrink Wrap and a CC2 kit.

Control of toxin: Do not use these products without proper ventilation in the space.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
All Electrical Energy Sources are De-energized Before Employees Enter the Space!!!	**De-energizing shut down procedures and LO/TO performed.**	**Visually and by trying to throw switches.**

Means of Access Into and Egress from Space: Access into the space will be through cast iron doors or a manhole cover. The space will contain a fixed ladder or employees may have to place a ladder in the space for entry into the vault.

Means to Prevent Unauthorized Entry: All vaults have doors or manhole covers that are extremely heavy and require tools to open.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn) None required.

Special equipment required: If additional lighting is needed, explosion proof lighting shall be used.

Rescue Procedure: Whenever a Non-Permit Required Access space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 15 **Space:** Boiler Fire Boxes

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation Date: 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for explosive, mechanical, and physical hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

17) After the plant is shut down and equipment has had a chance to cool.
18) After application and verification of Lockout/Tagout procedures for specific equipment.
19) After atmospheric testing demonstrates that explosive vapor readings are at acceptable levels.
20) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

*Down grading to Non-Permit Required Access Status is not permitted when "hot work" is being performed in the space.

Description: The "firebox" is the boiler section where coal or natural gas is burned to turn water into steam. The firebox is on the bottom of the boiler. It has a platform or grate that transports burning coal through the boiler. The top of the firebox contains tubes where water is turned into steam from the heat of the burning coal or natural gas. Entry into the firebox will be required to make repairs to the grate, tubes, etc.

Current use of space: The firebox holds the combustion that makes the boiler work.

Previous use of space: Same as current use.

Potential for Atmospheric Hazard? Yes.

If yes, complete the following section.

Oxygen Deficiency Potential (less than 20%)? No.

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 23.5%)? No.

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? Yes.

Source(s) of explosive atmosphere: Natural gas from the burners on the natural gas boilers.

Control of an explosive atmosphere: Entrant(s) will ensure that all system shutdown and Lockout/Tagout (LO/TO) procedures have been applied to specific equipment and all sources of hazardous energy, before entry into a natural gas firebox.

Next, still prior to entry, the atmosphere will be tested for explosive vapor content with a multi-gas explosion meter that has been calibrated in accordance with the manufacturer's instructions. The space will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done. This process will continue until all areas in the space are tested.

After the space is entered, the attendant must continually stay in contact with the entrant and monitor the space for an explosive atmosphere until the entrant leaves the space.

If explosive vapor readings rise above 10% of the Lower Explosive Limit (LEL), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when explosive vapor readings have returned below 5% of the LEL

After reentry, if explosive vapor readings continue to rise above 10 % of the LEL, or will not go below 10% of the LEL when ventilating, contact supervisor.

Toxic Atmosphere Potential? **No.**

Toxin: Not Applicable.

Source(s) of toxin: Not Applicable.

Control of toxin: Not Applicable

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Fans	**Follow existing Steam and Chill Plant shutdown procedures.**	**Try to start fans.**
Natural Gas	**Follow existing shutdown procedures.**	**If fans are shut down, natural gas valve won't open.**
Conveyor	**Follow existing shutdown procedures.**	**Try to start conveyor.**

Means of Access Into and Egress from Space: Through hatches located in various locations.

Means to prevent unauthorized entry:
Hatches are secured requiring tools to open during normal operations.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn) Knee pads and gloves if crawling, hard hats if head injury possible.

Special equipment required: Low voltage lighting.

Rescue Procedure: When a Non-Permit Required space is entered, a second employee will remain outside the space and in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 16 **Space:** Boiler Breaching

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation date: 02/01/08

Prepared by: James Burchfield **Title:** Safety Manager

Classification:

_____ Restricted Access
___√___ Non-Permit Required
_____ Permit Required

Reason for classification: **This space has the potential for atmospheric, mechanical and physical hazards.**

Procedure for down grading space to Non-Permit Required status:

This space may be reclassified as Non-Permit Required Access:

21) After the plant is shut down and equipment has had a chance to cool.
22) After application and verification of Lockout/Tagout (LO/TO) procedures for specific equipment.
23) After atmospheric testing demonstrates that oxygen readings are at acceptable levels.
24) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

*** Down grading to Non-Permit Required Access status is not permitted when "hot work" is being performed in the space.**

Description: Part of the boiler system, the boiler breaching is located on the first floor between the boiler and the main stack. The outside breaching is 10 feet wide and 6 feet tall. The inside breaching is 10 feet wide by 3 foot tall. Employees may have to enter the space for inspection and repairs.

Current use of space: The boiler breaching is a space where gasses are transferred from the boiler to the stack.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **Yes.**

Source(s) of oxygen deficiency:
Oxygen deficiency may also occur in the breaching due to rusting of the breaching between the time the system is taken off line and prior to employee entry.

Control of oxygen deficiency: Prior to entry into the breaching, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the entrant has left the space.

If oxygen readings are not acceptable (>19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment hazard procedures.)

After reentry, if oxygen levels continue to fall below 19.5%, or will not go above 19.5% when ventilating, contact supervisor.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **No.**

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Fans	**LO/TO fan controls and normal shutdown procedures.**	**Try to start fans.**

Means of Access Into and Egress from Space:
Access into the space will be through a 2.5 foot by 2.5 foot panel on top of the breaching or by a 2.5 foot to 3 foot iron door by the stack.

Means to prevent unauthorized entry:
Hatches are secured requiring tools to open during normal operations.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn)
Knee pads and gloves if crawling, hard hats if head injury possible. Employees may also need to wear double strap disposable dust mask because of nuisance fly ash.

Special equipment required: None required.

Rescue Procedure: When a Non-Permit Required Space is entered, a second employee will remain outside the space and stay in contact with occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 17 **Space:** Package Boiler Stack

Campus: Belknap – Steam & Chill Water Plant

Re-evaluation Date: 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for physical hazards (slips, trips and falls).**

Procedure for down grading space to Non-Permit Required status:
This space may be reclassified as Non-Permit Required Access:

25) After the plant is shut down and equipment has had a chance to cool.
26) After ensuring that no chemicals or other materials will be brought into the space and no cutting or welding will be performed.

*** Down grading to Non-Permit Required Access Status is not permitted when "hot work" is being performed.**

Description: The Package Boiler Stack is used to vent exhaust gases from the gas fired package boiler. Employees may have to enter the space for inspection and repairs.

Current use of space: To transport flue gases from the boiler to the atmosphere.

Previous use of space: Same as the current use.

This space cannot be entered by employees when the natural gas burners are on! The burners must be turned off and LO/TO before any entry can be made into the package boiler stack space!

Potential for Atmospheric Hazard? **No.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **No.**

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **Yes.**

Toxin: Carbon Monoxide.

Source(s) of toxin: Exhaust flue gases from burning natural gas.

Control of toxin:

Prior to entry into the package boiler stack, the atmosphere inside is to be tested for carbon monoxide with a carbon monoxide meter that has been calibrated in accordance with the manufacture's instructions. The space to be entered will then be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for carbon monoxide. This must continue until the entrant has left the space.

Potential for Hazardous Energy? **No.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*

Means of Access Into and Egress from Space: Access into the space will be through a bolted manway panel 3 feet from the bottom of the package boiler stack.

Means to prevent unauthorized entry: Hatches are secured requiring tools to open during normal operations.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment: (other than what is normally worn)
None required.

Special equipment required: None required.

Rescue Procedure: Whenever a Non-Permit Required space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 18 **Space: Roof Cooling Towers**

Campus: Belknap – Steam & Chill Water Plant, UTA, University Club and Henry Voigt Building. Shelby Campus – Central House, Founders Union, and Burhans Hall.

Evaluation Date: 02/01/08

Prepared By: James Burchfield **Title: Safety Manager**

Classification:

_____ **Restricted Access**
__√__ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: **This space has the potential for electrical, mechanical, and physical hazards.**

Procedure for down grading space to Non-Permit Required status:
The electrical, mechanical, and physical hazards shall be isolated by using Lockout/Tagout (LO/TO) procedures prior to entry into the tower.

After application and verification of (LO/TO), the tower may be entered as a Non-Permit Required Space.

Description: Located on the building's roof, the cooling towers are used to cool water for use in the HVAC system. The roof cooling towers contain material with large surface areas for water to flow across. A large fan on top of the tower pulls air up through the tower to cool it.

Current use of space: The cooling towers are used to cool water.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **No.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **No.**

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (greater than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **No.**

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Fan motor	Disconnect fan.	Try to start fan or test with voltmeter.

Means of Access Into and Egress from Space: Through hatch located on sides of towers.

Means to prevent unauthorized entry: Hatches are bolted shut during operation.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as Non-Permit Required Access.

Personal Protective Equipment (other than what is normally worn):

Special equipment required: None required.

Rescue Procedure: Whenever a Non-Permit Required space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 19 **Space:** HVAC Duct Work

Campus: All **Re-evaluation Date:** 04/17/03

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

__√__ **Restricted Access Only**
_____ **Non-Permit Required**
_____ **Permit Required**

Reason for classification: This space is considered "Restricted Access Only" because the larger air ducts have doors for access and egress, may be lighted and are properly vented. Smaller air ducts that can be bodily entered can have their mechanical, electrical, and thermal hazards abated through Lockout/Tagout (LO/TO) and will not contain atmospheric hazards.

This space may be an entrapment hazard for employees that bodily enter the space or a fall hazard if the ductwork falls with the employee inside. This space also has the potential for mechanical or electrical hazards from fans, blowers, motors, etc., that are contained in the ductwork.

If air ducts are large enough to enter, but small enough to become entrapped in, employees shall not enter these spaces. The interior of these ducts will have maintenance performed on them by the employee cutting access holes and reaching-in to do the work while keeping their bodies outside of the duct.

When working in or on the interior of ductwork, the air-handling unit and any fans, blowers, motors, etc., contained in the ductwork, shall be shut down and Lockout/Tagout (LO/TO) procedures applied to the unit

If air ducts are not sufficiently anchored and suspended to support an employee's body weight, the employee shall work on the ductwork from the outside as stated above.

Description: Located in many University buildings, the ductwork is part of the heating, ventilation and air conditioning (HVAC) system. Some ductwork may be large enough to bodily enter and employees must be extremely careful when doing so. If the ductwork is not sufficiently anchored and suspended to support an employee's body weight, the employee shall not enter the space.

Current use of space: To transport air from HVAC units to occupied spaces in the building.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **No.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **No.**

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **No.**

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section or reference existing equivalent information.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Fan/blower motor(s)	Turn off motor(s) or disconnect motor(s) from power source, LO/TO.	Try to start fan/blower motor(s) or test with voltmeter.

Means of Access into and Egress from Space: Through hatches located in various locations, by cutting openings, and by taking ductwork apart.

Means to prevent unauthorized entry: Ductwork and hatches are in locked areas (mechanical rooms) and above ceilings (classrooms and offices).

Entry and retrieval equipment: None required if all hazards are abated and space is classified as "restricted access only."

Personal Protective Equipment (other than what is normally worn): Kneepads and gloves if crawling, hard hats if head injury is possible.

Special equipment required: Flashlight, Tyvek, and/or double strap dust mask may be necessary if duct work is extremely dirty and contains microbiological growth.

Rescue Procedure: Whenever a "restricted access" space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

University of Louisville
Confined Space Evaluation

Evaluation Number: 20 **Space:** Tunnel System

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

___√___ **Restricted Access Only**
_____ **Down Gradable to Restricted Access**
_____ **Permit Required**

Reason for classification: **This space is considered "Restricted Access Only" because the tunnel system has doors for access and egress, is lighted, vented, and is configured for human occupancy.**

This space has the potential for many hazards due to the length and remoteness of the tunnel system. Obtaining assistance in the event of an emergency may be difficult.

Employees could incur injuries in this space mainly from slipping, tripping, or falling. Employees could also suffer injuries from exposure to extreme heat or cold while in this space and from being exposed to electrical and/or mechanical hazards. Employees must follow the Physical Plant Lockout/Tagout (LO/TO) procedures while in this space.

Description: The University of Louisville's buildings are heated and cooled by a steam and chilled water system. This system originates at the University's Steam and Chilled Water Plant. Steam and chilled water is carried to the buildings by piping that runs out from the Steam and Chilled Water Plant through an underground tunnel system. Access is provided to the tunnels from the basements of most buildings and through hatchway openings found in various locations on campus including streets, sidewalks, parking lots and grass areas.

Current use of space: Tunnels are used for piping that runs from the Steam and Chill Plant to buildings and from building to building. Other utilities may also have pipes and/or cables running through the tunnel system. This space is also used to allow new and/or additional piping and/or cables to be added to the system.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **Yes.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? Yes.

Source(s) of oxygen deficiency: Steam can displace the oxygen in a tunnel.

Control of oxygen deficiency: Prior to entry into the system, the atmosphere shall be tested for oxygen content with an oxygen deficiency meter that has been calibrated in accordance with the manufacturer's instructions. The space to be entered will be tested from top to bottom. If this is not possible, the space will be tested to the extent possible, entry made into the area tested, and further testing done from there. This process will continue until all areas in the space are tested.

If oxygen readings are not acceptable (>20% oxygen), the space shall be ventilated.

(See ventilation procedure.)

If the atmosphere in the tunnels could be oxygen deficient because of a leaking steam line(s), the steam line(s) shall be shut down and the tunnels purged of steam through ventilation. The steam lines shall then be locked and tagged out and blanks placed in the lines to keep steam from escaping while performing maintenance.

Oxygen Enrichment Potential (greater than 23.5%)? No.

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? No.

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? No.

Toxin: Not applicable.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

If yes, complete the following section:

Follow specific lockout/tagout procedure for each piece of equipment being repaired in tunnel.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Steam	**Shut valves, apply locks and tags. Place blanks in steam lines.**	**Try to open valves. Visual inspection of blanks in place.**

Means of Access Into and Egress from Space:

1.) Employees must report to the Steam and Chilled Water Plant before entering tunnel system.

2.) Employees must sign in and will be issued a key by Steam and Chill Attendant on duty.

3.) Employees will take the following items with them into the tunnel system:

Flashlight – Glove - Hard Hat - Oxygen Meter - 2 Way Radio

4.) Employees will enter through doors and gates in building basements and through hatchways on sidewalks, grass areas, etc.

5.) Upon exiting the steam tunnels, employees will lock doors or hatchways, return the key and sign out at the Steam and Chill Water Plant.

Means to prevent unauthorized entry: Doors and hatches are kept locked.

Entry and retrieval equipment: None Required.

Personal Protective Equipment (other than what is normally worn):
Employees must wear hard hats when entering the tunnel system. Employee will also wear proper clothing for heat protection if the steam system is active.

Special equipment required: Employees entering the tunnel system must be equipped with a two-way radio.

Rescue Procedure: Entry into the tunnel system will require a minimum of two (2) people.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. If the attendant can safely stay with the affected employee, they shall do so until help arrives. If the atmosphere or situation becomes hazardous, the attendant shall leave the affected employee in the space and exit the space to meet with the emergency crew. Under no circumstance shall the attendant re-enter the tunnels and attempt to rescue the occupant in the space!!!

Evaluation Number: 21 **Space:** Attics

Campus: All **Re-evaluation Date:** 02/01/08

Prepared By: James Burchfield **Title:** Safety Manager

Classification:

√ **Restricted Access Only**
____ **Downgradable to Restricted Access**
____ **Permit Required**

Reason for classification: **This space is considered "Restricted Access Only" because attics have doors for access and egress, are lighted, vented, and are configured for human occupancy.**

This space has the potential for mechanical and/or electrical hazards. Employees may also slip, trip and fall in the attic or fall through the ceiling to a lower level. Employees shall use boards, plywood, chipboard, etc. to construct walking and working surfaces to prevent slips, trips, and falls in the attic and to keep from falling through the ceiling to a lower level. Employees should use supplementary portable lighting if necessary.

Employees shall follow the Physical Plant Lockout/Tagout (LO/TO) procedures for electrical and/or mechanical hazards.

Description:

Many University buildings contain attic spaces large enough for employees to bodily enter and perform construction or maintenance activities. These attic spaces may contain various mechanical and/or electrical equipment. Most attics are poorly illuminated, if at all, and may not contain proper flooring for employees to walk or work on. Employees may need to prepare walking and working surfaces from boards, plywood, chipboard, etc. Employees may also have to provide supplementary lighting to perform their work safely.

Current use of space: Storage of building occupant's books, furniture, equipment and other materials and to allow maintenance staff to make repairs to electrical and/or mechanical equipment.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **No.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **No.**

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 23.5%)? **No.**

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? **No.**

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? **No.**

Toxin: _____

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? **Yes.**

Follow lockout/tagout procedures for equipment being repaired in attic.

Means of Access into and Egress from Space: Stairs, fixed ladders and portable ladders.

Means to prevent unauthorized entry: Doors are locked. Some entry hatchways are located above drop ceilings. These entrances limit access by their location.

Entry and retrieval equipment: None required.

Personal Protective Equipment (other than what is normally worn)**:**

Hard hats, if the head could strike something, gloves and kneepads, if applicable or crawling is required.

Special equipment required: Employees may need to prepare walking and working surfaces from boards, plywood, chipboard, etc. Walking and working surfaces should span ceiling supports and be of sufficient strength to prevent employees from breaking through and falling to the level below. Employees may also have to provide supplementary lighting to perform their work.

Rescue Procedure: Whenever a "restricted access" space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Confined Space Evaluation

Evaluation Number: 22

Space: Air-Handling Units (AHU's)

Campus: All

Re-evaluation Date: 02/01/08

Prepared By: James Burchfield

Title: Safety Manager

Classification:

_√_ **Restricted Access Only**
___ **Downgradable to Restricted Access**
___ **Permit Required**

Reason for classification: **This space is considered "Restricted Access Only" because the larger Air Handling Units (AHU's) have doors for access and egress, are lighted and properly vented. Smaller AHU's that can be bodily entered can have their mechanical, electrical, and thermal hazards abated through Lockout/Tagout (LO/TO) and will not contain atmospheric hazards.**

This space has the potential for mechanical, electrical, and/or thermal hazards.

Follow the Physical Plant LO/TO procedures and the specific LO/TO procedure for each AHU.

Description:

Located in many University buildings, the AHU's are part of the heating, ventilation and air conditioning (HVAC) system. Some of these units are large enough to bodily enter and employees must be extremely careful when doing so. These units contain heat exchangers, cooling coils, fans, blowers, drain pans, and air filters. Entry may be required to service these components.

Current use of space: To provide HVAC to occupied spaces of University buildings. Employees may access space to make repairs to internal components of AHU.

Previous use of space: Same as the current use.

Potential for Atmospheric Hazard? **No.**

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? **No.**

Source(s) of oxygen deficiency: Not applicable.

Control of oxygen deficiency: Not applicable.

Oxygen Enrichment Potential (greater than 23.5%)? No.

Source(s) of oxygen enrichment: Not applicable.

Control of oxygen enrichment: Not applicable.

Explosive Atmosphere Potential (> than 10% of LEL)? No.

Source(s) of an explosive atmosphere: Not applicable.

Control of an explosive atmosphere: Not applicable.

Toxic Atmosphere Potential? No.

Toxin: Only Non-Corrosive Cleaners are to be used by Employees.

Source(s) of toxin: Not applicable.

Control of toxin: Not applicable.

Potential for Hazardous Energy? Yes.

If yes, complete the following section.

ENERGY SOURCE	*CONTROL METHOD*	*VERIFICATION*
Electrical	**Open and lock disconnect.**	**Push the start button.**
Thermal	**Close and lock steam valves.**	**Physical check of closed valve.**
Thermal	**Place insulating covers on hot parts that could be contacted.**	**Visual inspection.**
Mechanical	**Block blower or fan to prevent rotation.**	**Try to rotate blower cage or fan by hand to see if it will turn.**

Means of Access into and Egress from Space: Doors, screwed on panels, and by cutting access holes into the AHU.

Means to prevent unauthorized entry: AHU's are in locked mechanical rooms, attics, basements, etc.

Entry and retrieval equipment: None required if all hazards are abated and space is classified as "restricted access."

Personal Protective Equipment (other than what is normally worn)**:**
Hard hats, if the head could strike something, and gloves, if appropriate for work being done.

Special equipment required: None required.

Rescue Procedure: Whenever a "restricted access" space is entered, a second employee shall remain outside the space and remain in contact with the occupant by sight, voice, radio, etc.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance. Under no circumstance shall employees attempt to rescue the occupant in the space!!!

Section III

Specific Program Hazards

A. Confined Space Specific Hazards

University of Louisville
Confined Space Specific Hazard

Hazard Number : A **Hazard Type: Welding Torch**

Campus: All **Evaluation Date: 02/01/08**

Prepared By: James Burchfield **Title: Safety Manager**

Hazard: Oxygen/acetylene welding or cutting torch

Reason Hazard Exist: Oxygen and acetylene welding torches can be extremely hazardous in permit required confined spaces and restricted access spaces.

They have the potential to produce hazardous atmospheres, physical hazards, oxygen deficiency and oxygen efficient atmospheres.

Procedure for Down Grading Space to Restricted Access Status:

NOT PERMITTED !!!

When "hot work" is being performed in a space, the space must remain a Permit Required Space.

All maintenance employees are to receive training to inform them of the hazards associated with using an oxygen/acetylene welding or cutting torch.

Hot work in a permit confined space or restricted access space is not permitted without following appropriate procedure

Potential for Atmospheric Hazard? √ Yes ____ No

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? √ Yes ____ No

Source(s) of oxygen deficiency:

Oxygen deficiency may occur due to the consumption of oxygen by the flame from the torch when using the oxygen/acetylene welding apparatus.

Control of oxygen deficiency:

Prior to welding activities, attendant shall test the atmosphere of the space for oxygen levels with an oxygen meter that has been calibrated in accordance with the manufacturer's instructions.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the welding activities are over and the entrant has left the space.

If oxygen readings are not acceptable (<19.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned above 19.5% oxygen but not above 23.5% oxygen. (See oxygen enrichment potential.)

After reentry, if oxygen levels continue to fall below 19.5 %, or will not go above 19.5% when ventilating, contact supervisor.

When not in active use, the torch shall be shut off at the cylinder and/or removed from the space.

Oxygen Enrichment Potential (greater than 23.5%)? √ Yes _ No

Source(s) of oxygen enrichment: Leak from, or misuse of, an oxygen/acetylene cutting or welding torch.

Control of oxygen enrichment:

Prior to welding activities, attendant shall test the atmosphere of the space for oxygen levels with an oxygen meter that has been calibrated in accordance with the manufacturer's instructions.

After the entrant enters the space, the attendant must continually keep in contact with the entrant and monitor the space for oxygen levels. This must continue in the space until the welding activities are over and the entrant has left the space.

If oxygen readings are not acceptable (>23.5% oxygen), the entrant shall leave the space and the space shall be ventilated. (See ventilation procedure.)

Entrant can reenter space to work when levels have returned below 23.5% oxygen but are still above 19.5% oxygen. (See oxygen deficiency potential)

After reentry, if oxygen levels continue to go above 23.5%, or will not go below 23.5% when ventilating, contact supervisor.

When not in active use, the torch shall be shut off at the cylinder and/or removed from the space.

Toxic Atmosphere Potential ___ **Yes** _√_ **No**

Toxin: Not Applicable

Source(s) of toxin: Not Applicable

Control of toxin: Not Applicable

Explosive Atmosphere Potential? √ **Yes** ___ **No**

Source(s) of an explosive atmosphere:
Anytime compressed gasses are used, there is a possibility of fire and/or explosion from improper use of the compressed gas cylinders.

Control of compressed gas cylinder hazards:

All maintenance employees are to receive training to inform them of the hazards associated with using an oxygen/acetylene welding or cutting torch and compressed gas cylinders!!!

All maintenance employees MUST follow the OSHA requirements and Physical Plant Safety Handbook requirements for working with an oxygen/acetylene welding or cutting torch and compressed gas cylinders!!!

Personal Protective Equipment (other than what is normally worn):

For entrants;
23. Welding gloves;
24. Welding helmet or proper welding goggles;
25. Leather boots.
26. Cotton clothing – no polyester or other flammable clothing allowed!

For attendants;
Attendants must not look directly into torch flame as this can cause corneal damage and possible blindness.

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance.

Under no circumstance shall employees attempt to rescue the occupant in the space!!

University of Louisville
Confined Space Specific Hazard

Hazard Number : B

Hazard Type: Hazardous Chemicals/Materials

Campus: All **Evaluation Date: 02/01/08**

Prepared By: James Burchfield **Title: Safety Manager**

Hazard: Hazardous Chemicals/Materials

Reason Hazard Exist: Hazardous chemicals/materials can be extremely dangerous in Permit Required Confined Spaces and Restricted Access Spaces.

They have the potential to produce hazardous atmospheres, physical hazards, oxygen deficiency and oxygen efficient atmospheres.

Procedure for Down Grading Space to Restricted Access Status:

MAY NOT BE NOT PERMITTED!!!

When hazardous chemicals/materials are introduced to a space; depending on the type, amount and duration of chemical/material to be used; the space may or may not need to remain a Permit Required Space.

All maintenance employees MUST consult their supervisor and the Safety Manager before introducing hazardous chemicals/materials into a Permit Required or Restricted Access Space!!!

Potential for Atmospheric Hazard? √ Yes ____ No

If yes, complete the following section.

Oxygen Deficiency Potential (less than 19.5%)? √ Yes ____ No

Source(s) of oxygen deficiency:

Oxygen deficiency may occur due to the displacement of oxygen by the hazardous chemical/material vapors when used in a permit required confined space or restricted access space.

Control of oxygen deficiency: Review Material Safety Data Sheets (MSDS's) prior to taking any hazardous chemicals/materials into the space.

Oxygen Enrichment Potential (greater than 23.5%)? √ Yes _ No

Source(s) of oxygen enrichment: From the use of hazardous chemicals/materials that are oxidizers and may off-gas oxygen.

Control of oxygen enrichment: Review Material Safety Data Sheets (MSDS's) prior to taking any hazardous chemicals/materials into the space.

All maintenance employees MUST consult their supervisor and the Safety Manager before introducing hazardous chemicals/materials into a Permit Required or Restricted Access Space!!!

All maintenance employees are to receive training in the Physical Plant Hazard Communication program to inform them of the hazards associated with using hazardous chemicals/materials!!!

All maintenance employees MUST follow the OSHA requirements and Physical Plant Safety Handbook requirements for working with hazardous chemicals/materials!!!

Toxic Atmosphere Potential **√ Yes ____ No**

Toxin: Hazardous Chemicals/Materials

Source(s) of toxin: Hazardous chemicals/materials taken into a confined space or restricted access space to be used for making repairs can also be a source of toxic vapors.

Control of toxin: Review Material Safety Data Sheets (MSDS's) prior to taking any hazardous chemicals/materials into the system.

Explosive Atmosphere Potential? √ Yes ___ No

Source(s) of an explosive atmosphere: Hazardous chemicals/materials taken into a confined space or restricted access space to be used for making repairs can be a source of explosive vapors.

Control of hazardous chemicals/materials hazards: Review Material Safety Data Sheets (MSDS's) prior to taking any hazardous chemicals/materials into the space.

Personal Protective Equipment (other than what is normally worn):

For entrants;

27. Chemical resistant gloves;
28. Safety goggles and /or face shield;
29. Rubber boots.
30. Cotton clothing – no polyester or other clothing that will dissolve from chemicals!

In the event of an emergency, the attendant will radio or call Public Safety at (6111) for assistance.

Under no circumstance shall employees attempt to rescue the occupant in the space!!

Hydrogen sulfide (H_2S, CAS# 7783-06-4) is an extremely hazardous, toxic compound. It is a colorless, flammable gas that can be identified in relatively low concentrations, by a characteristic ***rotten egg*** odor. The gas occurs naturally in coal pits, sulfur springs, gas wells, and as a product of decaying sulfur-containing organic matter, particularly under low oxygen conditions. It is therefore commonly encountered in places such as sewers, sewage treatment plants (H_2S is often called ***sewer gas***), manure stockpiles, mines, hot springs, and the holds of fishing ships. Industrial sources of hydrogen sulfide include petroleum and natural gas extraction and refining, pulp and paper manufacturing, rayon textile production, leather tanning, chemical manufacturing and waste disposal.

Hydrogen sulfide has a very low odor threshold, with its smell being easily perceptible at concentrations well below 1 part per million (ppm) in air. The odor increases as the gas becomes more concentrated, with the strong rotten egg smell recognizable up to 30 ppm. Above this level, the gas is reported to have a sickeningly sweet odor up to around 100 ppm. However, at concentrations above 100 ppm, a person's ability to detect the gas is affected by rapid temporary paralysis of the olfactory nerves in the nose, leading to a ***loss of the sense of smell***. This means that the gas can be present at dangerously high concentrations, with no perceivable odor. Prolonged exposure to lower concentrations can also result in similar effects of olfactory fatigue. This unusual property of hydrogen sulfide makes it extremely dangerous to rely totally on the sense of smell to warn of the presence of the gas.

Health Effects of Hydrogen Sulfide

H_2S is classed as a ***chemical asphyxiant***, similar to carbon monoxide and cyanide gases. It inhibits cellular respiration and uptake of oxygen, causing biochemical suffocation. Typical exposure symptoms include:

LOW	0 - 10 ppm	Irritation of the eyes, nose and throat
MOD	10 - 50 ppm	Headache Dizziness Nausea and vomiting Coughing and breathing difficulty
HIGH	50 - 200 ppm	Severe respiratory tract irritation Eye irritation / acute conjunctivitis Shock Convulsions Coma Death in severe cases

Prolonged exposures at lower levels can lead to bronchitis, pneumonia, migraine headaches, pulmonary edema, and loss of motor coordination.

Working with Hydrogen Sulfide

Most countries have legal limits in force that govern the maximum allowable levels of exposure to hydrogen sulfide in the working environment. The typical permissible exposure limit in many countries is 10 ppm. While the distinctive odor of H_2S is easily detected, its olfactory fatigue effects mean that one cannot rely on the nose as a warning device. The only reliable way to determine exposure levels is to measure the amount in the air. Regular monitoring will help to identify areas and operations likely to exceed permissible exposure limits, and any areas that routinely pose overexposure hazards should be equipped with continuous monitoring systems.

With a vapor density of 1.19, hydrogen sulfide is approximately 20 percent heavier than air, so this invisible gas will collect in depressions in the ground and in confined spaces. The use of direct reading gas detection instrumentation should be required before entering confined spaces such as manholes, tanks, pits, and reaction vessels that could contain an accumulation of H_2S gas.

Wherever possible, exposure should be minimized by employing adequate ***engineering controls*** and ***safe working practices***. Such methods include ensuring good ventilation and changing work procedures and practices. Where engineering controls cannot adequately control levels of exposure, it may be necessary to supplement them with the use of suitable ***personal protective equipment*** (PPE) such as supplied-air respirators. A qualified industrial hygienist or safety professional should be consulted for guidance on the suitability and correct use of respirators.

Should a co-worker ever be overcome by H_2S gas, do not attempt a rescue until you are properly protected yourself. The rescuer can very easily get caught out by venturing into a confined space without adequate protection. Remember that at levels above 200 ppm, collapse, coma and death due to respiratory failure can occur within seconds after only a few inhalations so you can be overcome yourself very quickly. Such incidents are sadly all too common and only serve to make the rescue effort twice as difficult.

Safety (MSDS) data for hydrogen sulfide

General

Synonyms: hydrogen sulfide, hepatic acid, sewer gas, sulfur hydride, stink damp, sulfated hydrogen
Molecular formula: H_2S
CAS No: 7783-06-4
EC No: 231-977-3

Physical data

Appearance: colorless gas with strong odor of rotten eggs (odor threshold ca 0.2 ppt)
Melting point: -85 C
Boiling point: -60 C
Vapor density: 1.19
Vapor pressure: [Typical cylinder pressure ca. 17 bar)
Critical pressure: 88 atm
Specific gravity: 0.993 g/ml (liquid at BP), 1.539 g/l at 0C, 760 mm Hg (gas)
Flash point: -82 C
Explosion limits: 4.3 % - 46 %
Auto-ignition temperature: 260 C

Stability

Stable. **Highly flammable. May form explosive mixture with air. Note wide explosive limits.** Incompatible with strong oxidizing agents, many metals. May react violently with metal oxides, copper, fluorine, sodium, and ethanol.

Toxicology

Highly toxic - may be fatal if inhaled. Inhalation of a single breath at a concentration of 1000 ppm (0.1%) may cause coma. Corrosive when moist. Skin contact may cause burns. **There is a rapid loss of sense of smell on exposure to gas concentrations above 150 ppm, and this means that the extent of exposure may be underestimated.** Perception threshold ranges from 0.5 ppt to 0.1 ppm. Irritant. Asphyxiant.

Toxicity data

(The meaning of any abbreviations which appear in this section is given here.)
IHL-RAT LC50 444 ppm.
IHL-HMN LC50 800 ppm (5 min).
IHL-MUS LC50 634 ppm/1h.
IHL-GPG LCLO 1 mg/m3/8h

Risk phrases

(The meaning of any risk phrases which appear in this section is given here.)
R12 R26.

Transport information

(The meaning of any UN hazard codes, which appear in this section, is given here.)
UN No 1053. Hazard class 2. Subsidiary risks 6.1, 3.

Personal protection

Safety glasses, rubber gloves, good ventilation. Remove all sources of ignition from the working area.

Safety phrases

(The meaning of any safety phrases which appear in this section is given here.)
S7 S9 S16 S45.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

Section IV

Specific Program Training

A. Written Employee Training Modules