Bucknell
UNIVERSITY

Confined Space Program

1) PURPOSE

a) Bucknell University is committed to operating its campus in the safest manner possible, with concern for the individual and the protection of the environment in accordance with all applicable Federal and State statutes. The Confined Space Program, as outlined in the following sections, has been prepared to comply with applicable regulations promulgated by the Occupational Health and Safety Administration in particular Title 29 of the Code of Federal Regulations standard 1910.146. This program establishes the requirements that staff must meet in order to properly understand hazards associated with confined spaces, both permit required and non-permit required, at Bucknell University. All employees who will be completing work associated with confined spaces shall make every effort to comply with this program. Additionally, Bucknell University will make every effort to identify permit required confined spaces in the workplace as well as educate employees on the hazards they may encounter with these confined spaces.

2) SCOPE and APPLICATION

a) This program applies to all employees who are required to work in or around both permit and non-permit required confined spaces during normal work operations and during some non-routine or emergency operations..

3) RESPONSIBILITIES

a) Program Administrator

i) The Program Administrator for this program is Jeremy Fanning, EH&S Coordinator.

ii) Establishing a written Confined Space Program that includes evaluations of the confined spaces entered by the department.

iii) Establish and maintain a training program providing exposed employees with the understanding, knowledge, and skills necessary for safe and proper work in confined spaces.

iv) Shall review the Confined Space Program, using the completed permits, at least once per year, and shall revise the program as necessary to ensure that employees participating in entry operations are protected from confined space hazards.

v) Provide training on proper confined space entry techniques, recommend safety equipment, and assist in confined space evaluations.

b) Entry Supervisor

i) The entry supervisors list can be found in Appendix B.

ii) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.

iii) Verify that all controls are in place before authorizing the permit.

iv) Terminate or cancel the permit if a prohibited condition arises and the time and reason for terminating the permit.

v) Ensure that Safety Data Sheets are on hand for any substance for which one is required.

vi) Remove unauthorized individuals who enter or who attempt to enter the space during entry.

c) Authorized Entrants

i) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure

ii) Know the proper use of all equipment required for the entry to include rescue equipment and PPE.

iii) 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 when necessary.

iv) Alert the attendant whenever:

(1) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.

(2) The entrant detects a prohibited condition.

v) Exit from the permit space as quickly as possible whenever:

(1) An order to evacuate is given by the attendant or the entry supervisor.

(2) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation.

(3) The entrant detects a prohibited condition.

(4) An evacuation alarm is activated.

vi) Sign the Safe Work Permit prior to entry.

vii) The list of authorized entrants can be found in Appendix B.

d) Authorized Attendants

i) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.

ii) Be aware of possible behavioral effects of hazard exposures in authorized entrants.

iii) Continuously maintain an accurate account by name of authorized entrants in the permitted space.

iv) Remain outside of the space during entry operations until relieved by another authorized attendant

v) Communicates with authorized entrants as necessary to monitor status and to alert entrants of the need to evacuate the space.

vi) 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:

(1) If the attendant detects a prohibited condition.

(2) If the attendant detects the behavioral effects of hazard exposure in an authorized entrants.

(3) If the attendant detects a situation outside the space that could endanger the authorized entrants.

(4) If the attendant cannot effectively and safely perform all the duties required

vii) Summon rescue and other emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards.

viii) Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:

(1) Warn the unauthorized persons that they must stay away from the permit space.

(2) Advise the unauthorized persons that they must exit immediately if they have entered the permit space.

(3) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.

ix) Perform non-entry rescues as specified by the rescue procedure.

x) Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

xi) Sign the Safe Work Permit prior to entry

xii) The list of authorized attendants can be found in Appendix B.

4) PROGRAM ELEMENTS

a) Identification of Confined Spaces

i) All college grounds and facilities shall be evaluated for the presence of confined spaces. Each space shall be classified as permit-required or nonpermit-required corresponding to one of the different types of confined space as defined in the OSHA standard.

ii) Permit required confined spaces may be downgraded to nonpermit-required confined spaces as appropriate according to the guidelines established in the Reclassifying a Confined Space section of this document.

iii) The classification of a confined space may also change due to the introduction of new hazards. If hazards, which would change the classification of the confined space, are introduced then the Department of Environmental, Health and Safety shall assist in conducting a formal review of the procedure and reclassification of the confined space or any additional controls that must be implemented.

iv) A flow chart to assist in the identification and classification of confined spaces can be located in Appendix C of this document.

v) A comprehensive list of all confined spaces can be found in the EH&S office.

b) Reclassification of Confined Spaces

i) The program administrator or the designee, with the Department of Environmental, Health and Safety's approval, may reclassify a permit-required space to a nonpermit-required space as long as the following conditions are met:

(1) The permit-required space has no actual or potential atmospheric hazards or all hazards have been eliminated in the confined space without actually entering the confined space or all hazards with the exception of those atmospheric hazards that can be controlled by forced ventilation alone have been eliminated without actually entering the confined space.

(2) If entry is required to eliminate the hazard, it will be done in accordance with a normal permit-required entry.

(3) The program administrator or the designee must certify on the entry permit that all hazards have been eliminated.

c) Permit-Required Confined Space Entry

i) Acceptable Entry Conditions

(1) Due to the dangers that exist within Permit Required Confined Spaces, the following conditions must be addressed before entry:

(a) Isolation

(i) The Permit Required Confined Space shall be locked out in accordance with the requirements of the Bucknell University Lockout/Tagout Program.

(b) Purging and Flushing

(i) If a confined space contains an atmosphere that is flammable or considered immediately dangerous to life or health (IDLH), the area shall be purged or flushed before entrants may enter the space.

(ii) Continual forced ventilation may be necessary to keep some areas safe during entry.

(c) Barriers

(i) Barriers are required around permit required spaces when the following hazardous conditions arise:

1. Unauthorized entry
2. Objects falling into the space
3. Vehicular hazards around the space

ii) Entry Procedure

(1) The entry procedure can be found in Appendix D.

d) Required Equipment

i) The following equipment must be used as required to facilitate safe entry into permit-required confined spaces:

(1) Testing and monitoring equipment

(2) Ventilating equipment needed to obtain and maintain acceptable entry conditions

(3) Equipment necessary for communication between the attendant and plant operations dispatch and the attendant and the entrant

(4) All necessary PPE

(5) Lighting equipment needed to enable entrants to work safely

(6) Barriers and shields to prevent objects from entering occupied confined spaces or to prevent people from falling into open spaces

(7) Equipment, such as ladders, needed for safe entry and exit by authorized entrants

(8) All required rescue and emergency equipment

(9) Any other equipment necessary for safe entry into the rescue from permit-required confined spaces

e) Atmospheric Testing and Monitoring

i) Atmospheric testing is necessary for two purposes: (1) evaluation of the hazards of the permit space and (2) verification that acceptable entry conditions for entry into that space exist.

(1) Evaluation Testing

(a) The atmosphere of a confined space shall be analyzed using equipment of sufficient sensitivity and specificity to identify and evaluate any hazardous atmospheres that may exist or arise.

(b) Each department's quad gas detector is designed to perform tests for the following hazards:

(i) Oxygen Content

(ii) Hydrogen Sulfide

(iii)Carbon Monoxide

(iv)Lower Explosive Limit

(2) Verification Testing

(a) The atmosphere of a permit space which may contain a hazardous atmosphere should be tested for residues of all contaminants identified by the evaluation testing to determine that residual concentrations at the time of testing and during entry are within the range of acceptable entry conditions.

(3) Testing Duration

(a) Testing for each confined space should be completed prior to entry and throughout the duration of the confined space entry.

(4) Testing Stratified Atmospheres

(a) When monitoring for entries involving a descent into potential stratified atmospheres, the area should be tested a distance of approximately 4 feet in the direction of travel and to each side.

(5) Equipment Calibration

(a) To ensure that the atmospheric testing equipment is functioning properly, any direct testing device should not be used without performing the following three operations:

(i) Inspection

(ii) Calibration

(iii)Function Test

(b) All three operations should be performed according to specific manufacturer's instructions and documented on the Confined Space Gas Monitor Calibration/Inspection Log.

ii) Atmospheric Testing Procedure can be found in Appendix D. Needs Developed

f) Ventilation of Confined Spaces

(1) If it is determined that the permitted space contains an atmospheric hazard or an atmospheric hazard can arise the proper ventilation must be in place.

(2) If continuous ventilation is required then it shall be directed as to ventilate the immediate areas where a worker is or will be present.

(3) If new hazards are to be introduced, such as welding, use of solvents, or painting then the entry supervisor must reevaluate the ventilation needs.

(4) The air supply must be from a clean source and may not increase the hazards of the space.

g) Entry Permit

i) The entry permit, also known as the Safe Work Permit, is used to document that all prerequisites are completed, verify the hazards have been controlled, periodically record the results of continuous monitoring for permit-required confined space entry, record entrants/attendants, and explain any special controls or methods used to isolate the space and or the justification for changing the classification of a confined space.

ii) Entry permit must be completed by either an entry supervisor or the program administrator.

iii) Once permit has been completed, the following forms should be handled as follows:
    (1) White Form – Must remain at the job site for as long as the permit is open.
    (2) Pink Form – Shall be located in the Facilities break room of the first floor of the Geiger building.
iv) Following the completion of the work, the permit must be closed out by either the entry supervisor or the program administrator.
v) If the scope of work in the confined space changes and permitted work cannot be completed then the entry supervisor or program administrator must cancel the permit.
vi) Following closing/canceling of the permit, both forms shall be returned to the EH&S office to be filed.

h) Emergency Procedures
    i) Emergencies during a confined space entry can have catastrophic consequences if entrants, attendants, and potential rescuers have not developed a plan of action in advance. Appropriate means for rescue must be established prior to entry, selected from the following stages of rescue procedures:
        (1) Self-Rescue
            (a) Entrant self-rescue generally provides the most effective means of escaping a recognized confined space hazard. Self-rescue must immediately be enacted whenever an entrant, fellow entrant, or attendant recognizes the presence of a hazardous atmosphere, any signs or symptoms of over-exposure, or any other serious space hazards.
            (b) Self-rescue requires entrants to safely stop whatever they are doing and exit the space in the most expedient and safe manner possible.
        (2) Non-Entry Rescue
            (a) If the entrant becomes unable to perform a self-rescue, the attendant shall attempt to rescue the entrant by use of a mechanical device from outside the space if such a rescue will not further injure the entrant or the attendant.
            (b) For example, if it is apparent that the entrant has become incapacitated due to presence of a hazardous atmosphere, the attendant may perform a non-entry rescue.

(c) If there is no possible atmospheric hazard and if the entrant may have a potential back injury then the attendant shall wait for a rescue team to make the extraction.

(3) Entry Rescue

(a) If the entrant becomes unable to perform a self-rescue and the attendant is unable to perform a non-entry rescue, the attendant is to contact Public Safety via the emergency radio channel (Base 4).

(b) Bucknell University has made arrangements for the Lewisburg Fire Department to serve as its Confined Space rescue team.

i) Employee Training

i) All employees subject to this policy shall be trained in the following areas:

(1) The application of this program and all requirements therein to include the use of the confined space entry permit.

(2) The identification of confined spaces to include recognition of permit-required confined space signs and what constitutes a permit-required or non-permit confined space.

(3) Potential confined space hazards and how to recognize the behavioral effects of hazard exposure in authorized entrants.

(4) The use of all personal protective equipment required for entry into a particular space, including but not limited to:

(a) Air monitoring equipment

(b) Ventilation equipment

(c) Communication equipment

(d) Rescue equipment

(5) The duties of an entrant, attendant, and entry supervisor.

(6) How to respond to emergencies during confined space entry (including self-rescue, non-entry rescue and entry rescue).

j) Contractors and Visitors

i) Contractors, vendors, and other visitors are responsible for their own health and safety programs, including programs for any confined space entry work. Their programs must meet the requirements of the applicable OSHA standards, at the

minimum. Bucknell University contacts and liaisons with these individuals are responsible for sharing information about known or suspected confined spaces in advance.

5) PROGRAM EVALUATION

a) The Program Administrator will conduct periodic evaluations of the workplace to ensure that the requirements of this program are being implemented. The evaluations will include meeting with employees and supervisors as well as site inspections.

b) The Program Administrator will also conduct an annual evaluation of the written Permit-Required Confined Space Program

6) DOCUMENTATION and RECORDKEEPING

a) A written copy of this program is available in the EHS office. It is available to all employees who wish to review it. The program can also be found on the Environmental, Health and Safety page of the Bucknell University website. The OSHA standard can also be found on OSHA's website.

b) Also maintained in the EHS office are copies of training records. These records will be updated when: new employees are trained, existing employees receive refresher training, and when any changes are made to the program requiring training to be conducted.

7) 7.0 REVISION HISTORY

a) May 19, 2016 – Program updated to current format

b) February 22, 2017 – Confined Space Permit changed to Safe Work Permit. Appendix E removed. Appendix B updated.

Appendix A: Definitions

Acceptable Entry Conditions	The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.
Attendant	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	An employee who is authorized by the employer to enter a permit space.
Blanking or blinding	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	A space that meets the following requirments: 1. Is large enough and so configured that an employee can bodily enter and perform assigned work. 2. Has limited or restricted means for entry or exit (for example tanks, vessels, silos, storage bins, hoppers, vaults and pits are spaces that may have limited means of entry) 3. Is not designed for continuous employee occupancy
Double Block and Bleed	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	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	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	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)	The written or printed document that is provided by the employer to allow and control entry into a permit space
Entry Supervisor	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.
Hazardous Atmosphere	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:

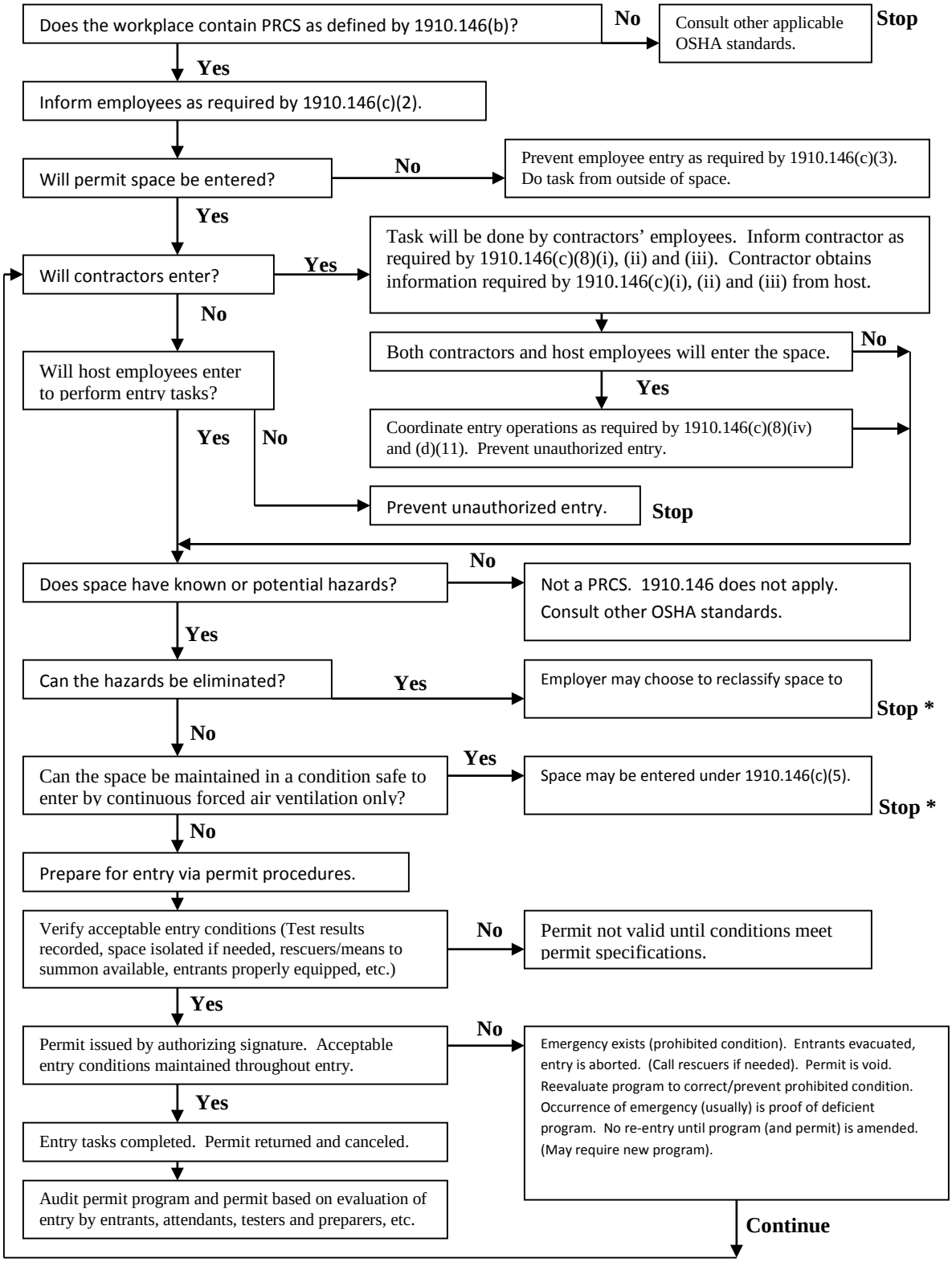
	1. Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL) 2. Airborne combustible dust at a concentration that meets or exceeds it LFL 3. Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent 4. Atmospheric concentration of any substance for which an exposure in excess of its dose or permissible exposure limit 5. Any other atmospheric condition that is immediately dangerous to life or health
Hot Work Permit	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)	Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.
Inerting	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.
Isolation	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	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	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	An atmosphere containing less than 19.5 percent oxygen by volume.
Oxygen Enriched Atmosphere	An atmosphere containing more than 23.5 percent oxygen by volume
Permit-Required Confined Space	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 tapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section. 4. Contains any other recognized serious safety or health hazard.
Permit-Required Confined Space Program	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	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	Any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Rescue Service	The personnel designated to rescue employees from permit spaces.
Retrieval System	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	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 B: Authorized Personnel

Entry Supervisors		
Electricians	**Utilities**	**Co-Gen**
David Eckley	Greg Koontz	Todd Hower
Gary Layton	Gary Napp	Todd Wetzel
Brent Bergey		
Authorized Entrants/Attendants		
Electricians	**Utilities**	**Co-Gen**
Raymond Anderson	Marc Bolinsky	Kevin Baker
Thomas Foerster	Michael Curry	Walter Casselberry
Michael Garinger	Michael Hackenberg	Steven Dunkelberger
Bart Getgen	Aaron Harvey	Terry Ketchem
Barry Heintzelman	Casey Kelchner	John Klinger
Joe Masana	Craig McCreary	David Pastuszek
Paul Rebuck	Robert Mowery	Eric Schrader
Brad Starr	Jared Mummey	Glenn Steese
Bryon Waltman	Randy Musser	Chris Walker
Barry Watts	Donald Rager	Robert Wells
	Gary Smith	Todd Wetzel
	Curtis Trutt	

Appendix C: Permit – Required Confined Space Decision Flow Chart



***Spaces may have to be evacuated and re-evaluated if hazards arise during entry.**

Appendix D – Confined Space Written Procedures

Pre-Entry Procedure

The following procedures will be conducted prior to entry. Any deviation from these procedures is a violation of the procedure and is prohibited.

1. Pre-plan each confined space entry to ensure all necessary equipment is available prior to commencing work.
2. Field test detection instruments to be sure they are in prior working order.
3. Check all personal protective equipment to verify that it is in good working condition.
4. Test the space with appropriate detection instruments to determine whether dangerous conditions exist, due to toxic or combustible gases or oxygen deficiency.
5. Complete entry permit. This permit is only good for the length of time it takes to complete a specific task and in no event will the length of time they are valid exceed 8 hours.
6. Ensure all emergency equipment is in place and operational.
7. When entrance covers are removed, a railing shall guard the opening or temporary barrier that will prevent an accidental fall through and will protect employees working in the space from foreign objects.

Entry Procedure

In order to begin the entry procedure, the atmospheric testing results must indicate no hazardous condition exists and the confined space is not subject to changing conditions or imminent risk of engulfment.

1. All personnel and personal protective equipment will be under the direction of the entry supervisor.
2. Implement pre-entry procedures as described previously.
3. Notify the Facilities communications base by radio of entry into a PRCS during normal business hours. During non-business hours, notify Public Safety (“Base 4”). When the task is completed, the appropriate base will again be notified by radio that the assignment is done.
4. Authorized entrant wearing full-body harness shall enter confined space with detection equipment. The retrieval lines must be secured to the retrieval equipment.
    a. A confined space with side and top openings will be entered from the side opening when practical.
    b. When entry covers are removed, the opening shall be guarded by a railing or other type of barrier that prevents an accidental fall through and will protect entrants from foreign objects entering the confined space.
5. Continual monitoring of the air will be required while working in the confined space.

6. An attendant is to be located outside the entrance to the space, and a standard procedure of communication must be established between the entrant and the attendant.
7. Maximum effort shall be made to drain and clear material from the confined space before entering.
8. If natural ventilation is not adequate forced ventilation shall be used. If electric ventilators are used, they must have the appropriate explosion proof rating.
9. When applicable, all pipelines leading into and out of the confined space shall be isolated by closing, and where possible, tagging the valves.
10. Where applicable, all mechanical equipment and mechanical lines located in the confined space should be discontinued at the power source and locked or tagged to prevent accidental energizing. The lockout shall be placed by the individual performing the work and shall only be removed by the same person. Tagging is only acceptable in situations where lockout is practical.
11. If ventilation can render the confined space safe, authorized employees may enter. If ventilation cannot render the confined space safe, the entry supervisor shall consult with the entry supervisor, David Eckley, or the program administrator, Jeremy Fanning. In their absence, the EH&S department or the Facilities' Assistant Associate Director responsible for the area.