UNGER
CONSTRUCTION CO.

Proof of Training (revised 1/25/17)

Print name: _____Signature: _____ Date: _____

Confined Space

Purpose

The purpose of this program is to ensure the protection of employees and subcontractors from the hazards associated with confined space entry. Our Bump Testing /Air Sampling, Respiratory Protection and Control of Hazardous Energies (Lock out - Tag out) programs are closely linked to the Confined Space Program. Workers must be familiar with and trained in all of these programs to perform work in a confined space.

Scope

This policy will apply to all work performed by employees and subcontractors including, but not limited to the following activities: construction, installation, demolition, remodeling, relocation, refurbishment, testing, and servicing or maintenance of equipment or machines and at other times when entry into a confined space is required.

Hazardous Material Survey

Unger Construction requires hazardous materials surveys before demolition or renovation work begins. The survey shall include all of the following: A visual inspection of a facility or a portion thereof for suspect materials, sampling and laboratory analysis of any suspect materials found for the presence of asbestos. The hazardous materials survey will also furnish a written report that includes: a description of the area(s) visually inspected, a detailed description of any suspect material sampled, the results of any laboratory analysis of suspect materials, the method of analysis, and the total amount of asbestos containing material. Typically a floor or roof plan is included with the report to reference the written information visually.

The person conducting the survey must be certified pursuant to OSHA and/or EPA regulations. The survey may be performed by a certified Site Surveillance Technician (SST) under the supervision of a licensed consultant. Note: The survey needs to be kept in a project file so that it can be accessed when working on future projects.

If lead or asbestos have been confirmed to be present employees and subcontractors must follow Unger Constructions Lead and/or Asbestos program. If hazards such as asbestos or lead will be disturbed during remediation, a properly licensed professional must perform the work and follow appropriate regulations.

Job Hazard Assessment (Safe Work Plan)

Unger Construction utilizes JHA's as our means of hazard assessment and establishing a safe work plan. JHA's are performed by supervisors and/or workers. Our library of hazard assessments is maintained on the "S" drive. Before beginning a new task refer to the JHA library, generally speaking all scopes of our

work are covered. For situations that have not yet been covered select one that is substantially similar and use it as a baseline. JHA's on the "S" drive are organized by work area and job description. JHA's include strategies for elimination, substitution, engineering and administrative controls. After applying all appropriate reduction and elimination technique, the remaining hazards will be analyzed and the proper PPE to reduce the hazards will be selected. PPE will be identified for hazards that are in the process of being reduced or eliminated and/or when hazard-reduction efforts are not 100% effective in eliminating the hazards.

For complex or moderate to high hazard tasks, tasks where an additional level of safety planning is needed, the safety director will perform the JHA with the supervisor and workers.

Responsibilities

Management (Board of Directors and Project Managers)

Management is responsible for ensuring that the materials (e.g., tools, equipment, personal protective equipment) and other resources (i.e., worker training materials) required to fully implement and maintain this program are readily available where and when they are required. Additionally, management will monitor the effectiveness of the program, provide technical assistance as needed, and review the program annually.

Program Manager

Dave Simpson is responsible for the development, documentation, training and administration of the program. This position carries the responsibility of ensuring this program is adhered to and that proper reporting is executed.

Supervisors (Superintendents and Foreman)

Supervisors are responsible for determining if the conditions are acceptable for entry, authorizing the entry and overseeing entry operations. With respect to this policy the supervisor is the competent person. The supervisor shall evaluate the work site and identify confined spaces. Supervisors must ensure that all authorized entrants are familiar with and understand the hazards, signs/symptoms of exposure, consequences of exposure, the engineering controls, air monitoring equipment and the means and methods to evacuate the space.

Supervisors must coordinate confined space entries when more than one entity performs confined space entry at the same time or whenever activities near the confined space could foreseeably result in a hazard within a confined space i.e., fumes, vapors, exhaust emissions or sparks.

Supervisors are responsible for ensuring that a confined space entry permit is completed as well as a task specific job hazard analysis (JHA), also known as a safe work plan. The JHA will select, implement and document the appropriate site-specific control measures as defined within this policy. Supervisors will direct the work in a manner that ensures the risk to workers is minimized, adequately controlled and that practices defined by this policy will be followed. Supervisors are responsible for ensuring Unger Construction employees and subcontractors are following expectations.

Supervisors will be held accountable for enforcing the requirements of this program. Undesirable behavior will not resolve itself, therefore supervisors must be directly involved with modifying behaviors inconsistent with program expectations. Supervisors will be held accountable for enforcing Unger Construction's disciplinary program.

Workers (Employees and Subcontractors)

Unger Construction has high expectations and requires safety excellence for each worker, crew, project and for our entire company. Workers are required to follow the minimum procedures outlined in this program. Workers are responsible for knowing the hazards and the control measures established in the JHA. Workers are responsible for using the assigned PPE in an effective and safe manner. Workers are responsible for stopping unsafe acts and correcting unsafe conditions on the spot as soon as they are discovered. Any deviations from this program must be immediately brought to the attention of your supervisor. Workers that choose to conduct themselves in a manner that is inconsistent with these expectations will be held accountable for those decisions and may incur disciplinary actions.

Attendants

Shall be knowledgeable of and able to recognize confined space hazards, maintaining a sign-in / sign-out log, monitoring the surrounding activities, maintain effective and continuous communication with entrants, and ordering the evacuation of the space and ensuring unauthorized personnel cannot enter the space. Additionally, attendants shall ensure hazards are not introduced into the confined space by workers performing tasks outside of the space. For example internal combustion engines whose exhaust emissions could cause a buildup of carbon monoxide, fumes, vapors or sparks.

Each confined space requires its own dedicated attendant, no sharing or multi-tasking is allowed. The attendant shall be dedicated to the confined space free of other job duties that might distract from the monitoring function. Attendants shall not be involved in discussions that could prevent them from observing all workers within the safety monitoring area. Attendants cannot use cell phones or any other device that could distract them while workers are at risk.

Attendants shall summon rescue and other emergency services as soon as the attendant determines the entrants need assistance. In situations where engulfment hazards are possible (for example working in a storm sewer during inclement weather, potential flash flood) at the first sign of a hazard the attendant must announce the evacuation of the space.

Entrants

Entrants must be familiar with and understand the hazards, signs/symptoms of exposure, consequences of exposure, the engineering controls, air monitoring equipment and the means/methods to exit the space in an emergency. Entrants shall read and observe the entry permit requirements, properly use PPE that is required by the permit, remain alert to the hazards that could be encountered, alert the attendant when warning signs or symptoms of exposure exist, immediately exit the confined space when a prohibited condition exists or as directed by the attendant.

Employees/subcontractors must not enter a confined space without formal training in this confined space policy and the operation of the 4:1 air monitor. They must complete a task specific job hazard analysis (JHA), and have written approval in the form of a confined space entry permit.

Training of Personnel

Training shall be conducted prior to initial assignment, when duties change, when new hazards have been created, and when deviations have occurred. Training shall be provided to all workers affected by the permit and assigned to duties to facilitate the entry at no cost to them. The training shall provide the understanding, knowledge, and skills necessary for the safe performance of the duties assigned.

The training must result in an understanding of the hazards in the confined space, methods to isolate/control the hazards. Unger Construction shall verify that the training required by the regulations has been accomplished. Workers affect by the training include: Authorized entrants, Attendants, Entry supervisors, Rescue and Emergency personnel or services.

Employees not authorized to perform confined space rescue shall be trained on the dangers in attempting such rescues. Nearly 66% of all confined space fatalities are would-be rescuers none of these would-be rescuers thought that they themselves would become victims. The psychological response to rescuing one of our own can cause would-be rescuers to respond with a blatant disrespect to their own safety, feeling compelled to do something. The right thing to do is to isolate the space until trained rescuers are on scene. Providing additional fresh air ventilation into the space from outside the space might be the only course of action.

Training records are available on the “S” drive.

Retraining

The need for retraining will be indicated when: An employee’s work habits or knowledge indicate a lack of necessary understanding, motivation or skills, New equipment is installed that requires new or different PPE, Changes in the workplace make previous training obsolete, Changes in the types of PPE to be used make previous training obsolete or Upon a supervisor request.

Definition of a Confined Space

In order to be considered a confined space all of the following statements must be true:

1) The space is not designed for continuous human occupancy. The basic rule of thumb is that the space is lacking lights and HVAC controls. Existing ventilation is insufficient to remove dangerous air contamination, oxygen enrichment and / or deficiency which may exist or develop.

2) Whole body entry (placing ones arm or head into a space is not considered entering a confined space)

3) Limited or restricted egress such as access hatches, ladders, crouching/crawling postures are considered limited or restricted egress. Note stairs and full height doors are not considered restricted access. Ready access or egress for the removal of a suddenly disabled worker is difficult due to the location and / or size of the opening(s).

Confined spaces include but not limited to manholes, storage tanks, process vessels, boilers, ventilation and exhaust ducts, sewers, chambers, tunnels, underground utility vaults, and pipelines.

Confined spaces can be created during the construction process. As soon as a confined space is identified workers must be informed of the existence, location and the danger posed.

A sign reading “Danger – Permit Confined Space- Do Not Enter Without Written Permission” shall be posted outside of each confined space.

Hazard Rating

Confined spaces are classified as either Non-permit “Low hazard” or Permit Required “High Hazard. Both require documented permitting procedures. Confined spaces are dynamic environments which can change based on the work within the confined space (such as welding or line breaking, fumes or vapors could develop in the space) or nearby the confined space (such as powered industrial equipment such as vehicles or generators, exhaust fumes could drift into the space).

“Low Hazard” Confined Spaces are those spaces determined to be free of atmospheric hazards, engulfment and entanglement risks. A low hazard confined space that does not, have the potential to contain any hazard capable of causing death or serious physical harm. Generally speaking Low Hazard confined spaces are vaults or manholes. Even though they are classified as low hazard Unger Construction requires continuous air monitoring via the 4:1 monitor. In some situations continuous forced fresh air ventilation will be required to provide an additional level of protection.

Whenever hazardous materials or high risk procedures are introduced into low hazard confined spaces the space must be upgraded to a high hazard/permit required confined space, due to potential hazardous work conditions.

After utilizing proper control of hazardous energies and purging processes some High Hazard confined spaces can be reclassified (downgraded) to Low Hazard. The process for downgrading the hazard level is to perform a baseline assessment, verify the effectiveness of the control of hazardous energies. Note: no single point of failure can present a hazardous situation. In order to downgrade the risk, redundant, but separate methods of isolation or control are required.

“High Hazard” Permit Required Confined spaces include the characteristic of a low hazard confined space and have one or more of the following criteria: Contains or has the potential to contain a hazardous atmosphere. Contains a material that has the potential to engulf or trap the entrants. For example liquid, pellets or small solids that could flow into the space. Has an external configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward to a smaller cross-section. Contains any other recognized serious safety or health hazards such as an unsafe temperature, potential for electrical shock, exposure to hazardous chemicals or other hazards that can interfere with a workers ability to leave the space without assistance.

Exclusions

Unger Construction does not self-perform work in high hazard permit required confined spaces.

Baseline Assessment

The confined space baseline assessment will determine the potential hazards and the special precautions that apply to that particular confined space. If the confined space is part of an existing campus they will likely have a baseline assessment on file. Speak to the operations, engineering or maintenance organizations to review a copy of the baseline assessment. If a baseline assessment is not available create one where you are completing the entry permit. For new construction the baseline assessment should be created and kept on file with the project team. The baseline assessment will likely change numerous times throughout the construction process. Therefore the baseline assessment shall be saved with incremental revision numbers to indicate the hazards that have changed during the course of construction.

The baseline assessment shall include the areas near the confined space that could create hazards for the confined space entrants for example exhaust streams from nearby equipment such as internal combustion engines, or construction processes that generate fumes. Controls for these types of potential exposures shall be included in the job hazard analysis. For some confined spaces ground controls shall be implemented to isolated and protect the confined space from pedestrians and vehicles. Methods of protection could include barricades, fencing, signage, k-rails or a ground spotter/flagger.

Testing the space

Unger Construction utilizes a 4:1 air sampling/monitor tool to test for the most common contaminants and concerns in confined spaces. The 4:1 air sampling/monitor tool tests for atmospheric oxygen concentration levels and common toxic gases in a confined space. Oxygen and Methane are measured as a percentage. Methane is used to test for flammable or explosive gas, vapor, or mist. Carbon Monoxide and Hydrogen Sulfide are measured in parts per million (PPM). Oxygen levels in a normal fresh air environment will be 21%.

- Oxygen levels are safe if they are between 19.5% - 23.5%.
- Carbon Monoxide (CO) - Permissible exposure limit is 25 ppm.
- Hydrogen Sulfide (H2S) - Permissible exposure limit is 10 ppm.
- Methane (CH4) –Permissible exposure limit is 10% of the lower explosive limit (LEL).

All entrants should witness the baseline profile of the confined space before entering the space.

Prior to entering any confined space a quality assurance “Bump Test” of the 4:1 monitor must be performed and recorded. Bump Testing uses a calibration gas mixture with known concentrations of gases that will “bump” and confirm each of the 4:1 monitor sensors are performing as expected. All entrants should witness the bump test before entering the space.

The potential air constituents in a confined space could vary from the more common contaminants. To confirm our typical 4:1 monitor tool is appropriate for your particular confined space read the product label or SDS for all potential constituents in this particular confined space. Air sampling/monitors must be capable of detecting the atmospheres identified to be present in the space, be calibrated according to manufacturer’s recommendations, and be maintained according to manufacturer’s recommendations. Air sampling/monitors, that are better tuned to detect the air constituents of your confined space, shall be rented.

SDS sheets will also provide the permissible exposure limit (PEL) or Immediately Dangerous to Life or Health (IDLH) condition information you will need to make the proper selection of a respirator.

The initial atmospheric profile of the confined space shall test the space at various levels (e.g., top, middle and bottom of the space). After profiling the atmospheric volume of the confined space the 4:1 monitor shall be placed in the position that will provide the earliest means of warning to workers. For example in confined spaces where exhaust fumes, that are heavier than air, could drift into and settle in the confined space the 4:1 monitor shall be positioned near the workers breathing zone. For fumes that are lighter than air the 4:1 monitor shall be positioned above the workers breathing zone.

Continuous monitoring is required throughout the course of the work. Results must be recorded on the "Confined Space Permit" before entrants enter the space to begin work and periodic tests must be recorded at least every hour.

Ventilation of the Space

Whenever existing ventilation is insufficient to remove potentially dangerous air contamination or unfavorable contamination could drift into the space due to natural ventilation forced ventilation of the confined space is required. Potentially hazardous atmospheres will require continuous ventilation of the space. Ventilation must be at a rate of at least 4 times the volume of air in the space per hour. Always use mechanical ventilation, fans or ventilators. Do not attempt to inert the space with a purge gas. Make sure the air supply to the ventilator is not contaminated. If using a gas powered ventilation system, do not allow the ventilator to exhaust into the space. Powered industrial equipment, generators and vehicles shall be kept well away from the ventilator to ensure exhaust fumes do not drift or migrate into the air intake system of the ventilator. The ventilator must be placed far enough from the space as to not re-circulate the air from the space, back into the space. There may be no hazardous atmosphere within the space whenever any worker is inside the space.

Continuous forced air ventilation shall be used as follows: A worker may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere. The forced air ventilation shall be so directed as to ventilate the immediate areas where a worker is or will be present within the space and shall continue until all workers have left the space. The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.

The forced ventilation must be directed to ventilate the immediate area where workers are performing their duties as well as where the workers will be performing their duties. Ribbons or flags shall be attached to the forced ventilation device as a visual indicator of performance. In the event that the ventilation system stops working entrants shall exit the space immediately.

The atmosphere within the space shall be monitored continuously and periodically to ensure that continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. Readings shall be recorded on the log a minimum of four times a day (example: beginning of shift or entry, after breaks, and after lunch), the results will be recorded. If a hazardous atmosphere is detected during entry: Each worker shall leave the space immediately, the space shall be evaluated to determine how the hazardous atmosphere developed and measures shall be implemented to protect workers from hazardous atmosphere before any subsequent entry takes place.

Communication System

A communication system must be established prior to entering the space. Communication systems for low hazard spaces are typically visual observation, cell phones or two way radios. For high hazard spaces the communication system should allow the attendant stationed outside the space to be in constant contact with all entrants. At least one entrant worker must be in sight or call of the standby worker. An effective method of communication may include: Verbal, Hand signals, Two-way radios, Signaling through safety lines when oral communication is not possible, Intercom system, Light signals, Tapping or rapping codes. All electronic equipment must be intrinsically safe (there must be no chance of becoming an ignition source), not interfere with atmospheric monitors, and always be backed up by a non-electronic communication system. The method of communication must be documented on the "Confined Space Permit".

Command and Control

Command and control of the confined space will vary based on the scope of work. Often times workers from multiple employers are working in the confined space at the same time. Prior to entering the confined space coordination of tasks shall be performed to ensure entrants working simultaneously within the space do not endanger each other. Procedures shall be developed and agreed upon by all entrants into the confined space.

Entrance Covers/Barriers/Signage

When entrance covers are removed the opening must be immediately guarded by a railing, temporary cover or other barrier that will prevent an accidental fall through the opening. Barriers shall be installed to ensure unauthorized workers cannot inadvertently enter the confined space. A sign reading "Danger – Permit Confined Space- Do Not Enter Without Written Permission" shall be posted outside of each confined space.

Operating Procedures

Host employers shall provide the location of each known confined space, the hazards or potential hazards in each space and any precautions that the host employer or any previous controlling contractor implemented for the protection of workers in the space.

Workers must be able to eliminate or isolate the hazards without entering the space. If testing and inspection during the pre-entry demonstrate that the hazards have been eliminated or isolated the space may be re-classified as a non-permit confined space.

Workers intending to enter high hazard confined spaces must have prior approval from Unger Constructions Safety Director. Written approval is obtained with a task specific job hazard analysis and the confined space permit. Entrants and rescuers will need to provide proof of training. Additionally, records of similar entries will be reviewed as well as rescue and emergency service procedures. Only trained and certified individuals with a completed and approved entry permit (which specifies available rescue and emergency services) may enter a high hazard confined space.

The following provisions shall be implemented before an individual is permitted to do confined space entry work: Written, understandable operating and rescue procedures shall be developed and shall be provided to affected workers. Operating procedures shall include provision for the surveillance of the surrounding area to avoid hazards such as drifting vapors from tanks, piping, sewers, exhaust, etc. Individuals, including standby person shall be trained in the operating and rescue procedures, including instructions as to the hazards that they may encounter.

If a hazard is detected during entry every worker must exit the space immediately. The space must be re-evaluated to determine how the hazard developed. Measures must be taken to ensure workers are protected from the hazard before and subsequent entry takes place.

Anytime that a confined space is evacuated for a safety concern or changes in the conditions listed on the permit the confined space permit shall be suspended. The confined space must be returned to the entry conditions listed on the permit before anyone is allowed to re-enter the space.

Whenever there are changes in the use or configuration of the space or there is some indication that the initial evaluation of the space may not be adequate the competent person shall re-evaluate the space and if necessary reclassify it.

Baseline assessments, confined space permits (including re-classification) and the JHA shall be posted outside of the confined space for workers to review.

Prior to performing work in a high hazard space the rescue team shall simulate rescue operations in which they remove dummies, manikin or persons from the space. Note that non-entry rescue is required. This rescue training requirement (practice) can be waived if training occurring less than 12 months ago. Each authorized entrant must wear a full body harness with a retrieval line attached to a mechanical device or a fixed point outside the confined space. Wristlets or anklets may be worn as an effective alternative when working in a horizontal confined spaces. When working in a vertical confined space greater than 5 feet deep a mechanical device must be available to rescue workers.

<u>Documentation Requirements for Permit Required Confined Space</u>

All of the following documentation and training must be completed prior to entry into a permit required confined space; Baseline Assessment, Complete the Confined Space Permit, Proof of Training (Confined space entrant, Rescue, First Aid/CPR, Respirators, CoHE, Hot work), Task Specific Job Hazard Analysis, proof of calibration for air sampling device, bump test, SDS's, Entry and Exit Sign-In Sheet.

<u>Pre-Entry for Low Hazard Confined Spaces</u>

Ensure that all physical hazards in the space are eliminated or isolated through engineering controls so that the only hazard is a potential hazardous atmosphere. Demonstrate by testing and documenting that continuous forced ventilation is sufficient to maintain a safe environment. Review or perform a baseline assessment, develop a task specific JHA and complete the confined space entry permit. Confirm the information has been reviewed and approved by Unger Constructions Safety Director. Post the signed copies of the approval documents at the point of entry into the confined space.

Pre-Entry for High Hazard Confined Spaces

In addition to the items listed above in the pre-entry for low hazard confined spaces. The following shall be adhered to prior to entry into a high hazard confined space. Identify all hazards that may be faced during entry. All forms of hazardous energy shall be controlled per Unger Constructions Control of Hazardous Energy (CoHE) Policy. Isolate the space from all hazards. For example, lines which may convey flammable, injurious, or incapacitating substances into the space shall be disconnected, blinded, or blocked. Close valves (block and bleed or blind flange). Empty the space (drain, vent, etc.). Lockout / Tag out equipment (electrical or hazardous materials). Clean residue from the space.

Obtain all the safety data sheets (SDS's) for materials to be used in the space and material currently present in the space. Information regarding the signs or symptoms, and consequences of the exposure must be obtained to assure all entrants have appropriate PPE or the hazard is removed prior to entry. All the SDS's must be on site during the entry. The attendant or entry supervisor must make all SDS's available to entrants and rescue personnel.

The confined space shall be emptied, flushed, or otherwise purged of flammable, injurious, or incapacitating substances to the extent feasible by forced ventilation or other means. The air shall be tested with gas detection equipment to determine whether dangerous air contamination and/or oxygen deficiency exists. A written record of such testing results shall be made and kept at the work site for the duration of the work.

A survey of the surrounding area to the confined space shall be conducted for hazard of drifting vapors from adjacent tanks, lines, sewers, and other work activity, etc. If a hazard exists, it will be corrected immediately. If the hazard poses a threat to the personnel in the adjacent confined space, they will be removed until it is safe to return.

Due to the possibility of a worker being injured, an "A" frame retrieval system shall be used (for the removal of injured workers) for all top entry into valve pits, vaults, etc. Each worker in the space shall wear a safety harness that suspends a person in an upright position.

If the space in the valve pit, vault, etc., is free from a hazardous atmosphere as determined by monitoring, an attendant is not required as long as there are a minimum of 2 people inside.

Permit required confined spaces must have a designated entry supervisor. Effective communication shall be established between standby or monitoring workers, and confined space workers. Hazardous materials, chemicals, or gas cylinders should not be taken into confined spaces without adequate ventilation to maintain a safe environment.

Permit required confined spaces must have a documented rescue plan with the rescue equipment being on site and ready to use. Rescue equipment may include but is not limited to a tripod, retrieval mechanism, full body harness and a tether (rope).

Personal Protective Equipment and Rescue Items for the High Hazard Entrant

All entrants into a high hazard confined space shall use a full body harness with a retrieval line attached at the entrant's back to be used for successful removal of the entrant. A wristlet may be used in lieu of the full body harness if you can demonstrate that the use of a full body harness is infeasible or creates a greater hazard and the wristlet is the safest alternative. A retrieval line must be attached to a mechanical devise or fixed point outside the space. A mechanical devise must be used to retrieve entrants from vertical spaces more than 5 feet deep. Emergency rescue procedures must be in place before making a permit-required confined space entry. In addition to the rescue and retrieval system requirements appropriate personal protective equipment identified in the JHA shall be provided for the entrant, the monitor and the potential rescue team members. Examples of the PPE could include respirators, hearing protection, eye protection, protective clothing, gloves, hard hats, task lighting and fire extinguishers.

Rescue Plans

Rescue plans for low hazard confined spaces are no different than those for the balance of the jobsite.

Rescue plans for high hazard spaces are unique. At least one standby worker shall be outside of the confined space to give assistance in case of an emergency. The standby worker must be outside of the confined space and equipped with the necessary gear to execute a recovery from outside of the confined space. For example a tripod equipped with a retrieval system. All workers who may enter dangerous areas in an emergency situation should be trained on rescue procedures, use of safety equipment, and proper procedures for entering and exiting a confined space. PPE including respirators, hearing protection, eye protection, protective clothing, gloves, hard hats, task lighting and fire extinguishers shall be staged nearby but outside of the confined space to enable a safe and rapid response. Rescue procedures must be documented on the "Confined Space Permit" and all Emergency Response team personnel on site notified of the procedures.

Rescue Team

Shall complete a training drill annually, have current CPR and first aid certifications, respond immediately when called.

Rescue Procedures

Radio or call for help, report status, and request assistance. Standby personnel shall attempt to remove the victim from the space by use of lifeline and hoisting device from outside the confined space. If the incapacitated worker cannot be lifted out of the space by means of the hoisting device, a rescue attempt may be initiated but only if the 4:1 air monitor is not indicating an environment that is immediately dangerous to life and health (IDLH). No entry is to be made into an IDLH atmosphere, or into a space that can quickly develop into an IDLH atmosphere. Remember that 2/3 of confined space fatalities are would be rescuers. In IDLH situations the only method of help might be to add additional ventilators in an effort to reduce the concentration below the IDLH.

In situations that are below the IDLH before the emergency responder enters the confined space they need assurance that emergency support (ERT or EMS) is on the way and that there is a backup person at the point of entry into the confined space. The emergency responder will don the safety harness and

attach it to the lifeline secured to the lifting device. The emergency responder should free the victim from any entanglements and lift the victim out of the space using caution to prevent further injury. Apply CPR and/or First Aid as required until emergency response help arrives.

Post Entry

When the task is complete all associated materials will be removed from the space. Confirmation that the space is ready to return to service will be performed by no less than 2 workers, use independent second set of eyes. Return to service will be performed per the job hazard analysis. Once the space is back to pre-entry conditions the emergency response equipment can be removed and returned to storage.

After each confined space entry the worker shall conduct a Lessons Learned activity, discussing what went well and opportunities for improvement. The Lessons Learned will be added to the files for the confined space permit and included in the closing documentation.

Attachments:

The following documents are attached for use in all confined space entries as they apply to the type of entry being performed. A copy of all completed forms must be forwarded to the Safety Manager at the completion of the work.

Type of Work Being Performed	**Documentation to be Completed**
Baseline Assessment	Confined Space Baseline Assessment
Non-Permit Low Hazard Confined Space	Justification for Non-Permit Confined Entry
Bump Test	Bump Testing / Air Sampling Training
Air Sampling Log Entry	Routine Air Sampling Readings

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Confined Space Baseline Assessment

Area ID:	Location:
Equipment ID:	#
Area Owner:	Permit Required:
Emer. phone location:	Emer. Shower location:
Emer. phone number:	

Description/Dimension

Description:

Dimensions:

Number of portals or entry points:	Portal Position:
Portal Size:	Portal elevated/below grade:

Hazard Identification (potential or existing)

☐ Oxygen deficiency (<19.5%)	☐ Entrapment (mech. equip. or tapered openings)
☐ Oxygen Enrichment (>23.5%)	☐ Engulfment (dry bulk or liquids)
☐ >10% Lower Flammable Limit (LFL/LEL)	☐ Hazardous electrical energy sources
☐ Toxic/hazardous gases? (specify below)	☐ Hazardous mechanical energy sources
☐ Spark/flame producing work	☐ Pressurized fluids or gases

☐ Hazardous radiation (IR, UV, ionization, RF)	☐ Cold (sufficient to cause hypothermia or injury)
☐ Low-lying region (collect exhaust, gas or vapor)	☐ Heat (sufficient to cause hypothermia or injury)
☐ Oxidation (rust)	☐ Work causes additional entry or egress restraint
☐ Other air borne materials (specify below)	☐ Fall Hazard
☐ Toxic/hazardous liquids? (specify below)	☐ Other serious safety or health (specify below)

Notes

Required Air Monitoring and Control Measures

☐ Air monitoring is required continuously.	Local Ventilation is required at_____CFM.
Air monitoring data required for: ☐ O_2, H2S, CH4, CO ☐ Other toxic gases: ☐ Other:	The preferred means: ☐ Local exhaust OR ☐ Forced ventilation (pull air from) (push air in)
Isolation of the CS by LO/TO is required. ☐ Electrical energy ☐ Blinding or blanking ☐ Mechanical Linkages ☐ Double block & bleed ☐ Pneumatic ☐ Purge & vent ☐ Chemical ☐ Flush	PPE is required. ☐ Full body suit_____ ☐ Level D clothing ☐ Level A clothing ☐ Level C clothing ☐ Face shield ☐ Level B clothing ☐ Resp. Pro. _____ ☐ Apron _____☐Gloves_____ ☐ Goggles_____☐Boots_____ ☐ To be determined
Supplemental lighting is required. ☐ Use flashlights or battery-operated lanterns. ☐ Use low-voltage lights. ☐ Use explosion-proof lights.	Communication equipment is required. ☐ Portable radio ☐ Cellular telephone ☐ Hard wire communication
☐ Voice or visual communication is adequate.	☐ Supplemental power is required.
Safety equipment is required.	Respiratory Protection Required ☐ Yes ☐ No

☐ GFCI	☐ Pedestrian/vehicle barriers	☐ APR List Type:
☐ Ladder	☐ Traffic cones	☐ SAR List source:
☐ Harness	☐ Tripod	
☐ Lanyard		

Rescue Pre-plan

CSR#:	CS Type:
Staging area:	
Is a patient lower, secondary to extraction, required? ☐ Yes ☐ No If yes, describe area available for lower._____ _____	

Anchorage: ☐ Tripod ☐ Beams ☐ Welded steel handrails ☐ Eyebolts ☐ Support Pillars ☐ Stairwell support beam ☐ None ☐ Other (specify) _____
☐ Standard equipment package ☐ Air monitoring Equipment Supplemental Equipment _____ Required _____

Prepared By:	Date:
Reviewer:	
Rescue Representative (if applicable):	
Approver:	Entered Date: By:

Notes:

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Low Hazard CONFINED SPACE ENTRY PERMIT	Date:	
	Job Number:	
	Project Name:	

Location & Description of Confined Space:

Purpose of Entry:

Date of Entry:

Entry Supervisor:

Entrants: **Attendants**:

TYPES OF HAZARDS: ***{Check those items below which have been verified nonexistent in the space.}***

❑ Oxygen-Deficient Atmosphere ❑ Engulfment ❑ Energized Electrical Equipment
❑ Oxygen-Enriched Atmosphere ❑ Toxic Atmosphere ❑ Entrapment
❑ Welding/Cutting ❑ Flammable Atmosphere ❑ Hazardous Chemical

SAFETY REQUIREMENTS	Yes	No	Date/Time	Checked By
Area secured_____				
Additional Ventilation Required_____				
Respirators Required for Entrants_____				
Rescue Plan & Team Established_____				
Primary Emergency Response Team				

Identified_____				
Lighting _____				
All entrants and attendants have been trained in Confined Spaces____				
Confined Space Signs Posted_____				
Other_____				

Bump Test **Date / Time**

Oxygen: _____% _____a/p

Lower Explosive Limit: _% _____a/p

Toxic Atmosphere: ____

Instruments Used: _____

Pre Entry Air Quality Test **Date / Time**

Oxygen: _____% _____a/p

Lower Explosive Limit: _% _____a/p

Toxic Atmosphere: ____

Instruments Used: _____

Worker Conducting Safety Checks: Print name: Signature:

Describe the overall condition of the confined space.

Entry Authorization	**Entry Cancellation**
Print name: Signature:	Entry has been completed and all entrants have exited permit space. Person in Charge of Entry Please Print

NOTE: Please post this permit near the confined space and keep an easily accessible copy available for reference.

Bump Test/Air Sampling Training
Proof Testing for Air Monitors (4 in 1 Gas Detectors)

Name: _____ **Company:** _____ **Date:** _____

Background
Construction workers can be exposed to dangerous atmospheric hazards that are unnoticeable. These hazards could be present in enclosed spaces, confined spaces and other environments that do not have rapid fresh air exchange rates.
Many of the gases that are a health concern for construction workers are odorless and colorless making them nearly impossible to detect; in essence there is no warning that they are present. The only way to detect these gases is with an air monitor. Air monitors are used to detect the presence of toxic and combustible gases, as well as oxygen deficiency or oxygen enrichment (a fire and explosion hazard). Initial: _____

4 in 1 Air Monitor
The 4 in 1 air monitor is a life safety device and should be treated with respect. At Unger Construction we utilize a 4 in 1 air monitor. The 4 in 1 air monitor analyzes Oxygen (O2), Methane (CH4), Hydrogen Sulfide (H2S) and Carbon Monoxide (CO) at the same time. The 4 in 1 monitor will accurately respond to the gases that it is designed to detect, warning users of hazardous conditions before they reach dangerous levels, giving workers time to evacuate the area and get to a safe place. The 4-in-1 kit includes a 34 liter gas bottle containing a precision multi-gas mix that designed to confirm the unit and all sensors are functioning correctly. Initial: _____

Gases
Oxygen is necessary to sustain life; it is naturally present at 20.9 percent. Relatively small changes in the percentage of oxygen can be harmful, even deadly. The acceptable range for oxygen is 19.5% - 23.5%. Oxygen (O2) is an odorless/colorless gas. Methane is an extremely flammable gas. Methane (CH4) is an odorless/colorless gas. Carbon Monoxide (CO) is an asphyxiant easily displacing oxygen. It is common in the exhaust stream of fuel powered industrial equipment. Hydrogen Sulfide (H2S) is flammable and explosive in high concentrations. Hydrogen Sulfide is a colorless gas that smells like rotten eggs, it is often found in manholes
Oxygen and Methane are displayed in percentage of volume. Hydrogen Sulfide and Carbon Monoxide are displayed in parts per million (ppm). To give you an example of how small these values are 0.00001% is equal to 10 ppm. Initial: _____

Terms
Lower Explosive Limit (LEL) is the lowest concentration (percentage) of a gas or vapor in air capable of producing a flash of fire in presence of an ignition source (arc, flame, heat). Gas concentrations lower than LEL are 'too lean' to burn. The safe limit for LEL is 10%. Anything above 10% is unsafe; workers must leave the area immediately and seek safe refuge.
Permissible Exposure Limit (PEL) is the amount that a worker can be exposed to 8 hours per day, 40 hours per week, 5 days per week for 30 years, in essence your career without harm. Levels above the PEL will require personal protective equipment, for example an air purifying respirator. The PEL for Hydrogen Sulfide is 10ppm for Carbon Monoxide it is 35ppm. Anything above the PEL is unsafe; workers must leave the area immediately and seek safe refuge. Initial: _____

Bump Test
While a 4 in 1 air monitor may appear to be sound during a visual inspection, it actually could be damaged internally, out of calibration or could have a sensor failure. The only way to guarantee that an instrument will detect gas accurately and reliably is to test it with a known concentration of gas. Exposing the instrument to a known concentration of test gas will show whether the sensors respond accurately and whether the instrument alarms function properly. Bump testing is necessary because the output of a typical gas sensor in clean air is zero. That's the same as the output of a non-functional or dead sensor. So exposing the instrument and sensors to gas is the only way to know that the sensor will respond to dangerous gas in the atmosphere. If the unit fails the bump test contact the Safety Director immediately. Work must be stopped until a replacement unit can be put into service. A bump test verifies calibration by exposing the instrument to a known concentration of test gas. The instrument reading is compared to the actual quantity of gas present (as indicated on the cylinder). If the instrument's response is within an acceptable tolerance range of the actual concentration, then its calibration is verified. The bump test will verify the audible, visual, and vibrating alarm response. Initial: _____

Bump Test Gas Detectors Daily

Portable gas detectors are precise electronic devices that play a critical role in protecting workers. Their ability to do their job properly is not always visually apparent. Bump test your air monitor every day prior to entering a suspect environment. Initial: _____

GX-2009 and RP-2009
The GX-2009 is the sensor unit and the RP-2009 is the pumping unit. Each unit has its own power button. They must be assembled together and both power buttons must be on to function properly. Battery life under continuous operation is 20 hours after full charge. Note it takes 3 hours for the unit to achieve a full charge. Charge the unit the day before you need it. Spare batteries for the pump unit are kept in the orange carry case. Initial: _____

Start-up Procedure for the GX-2009
The owner's manuals are kept in the orange case with the units. Backup copies of the owner's manuals and a video tutorial are kept on the "S" drive. Read them and become familiar with the units before taking them into the work environment. The GX-2009 has two buttons; Power Mode and Air. These buttons used individually or in tandem are the only user interfaces. Do not change the calibration or the alarm set points without written permission from the Safety Director. Initial: _____

Start in a fresh air environment, normal oxygen content (20.9) that is free of toxic or combustible gases. Press and hold the power mode button momentarily. Release the button when you hear a beep. When the unit starts up it will vibrate and the alarm lights will flash momentarily then the Calibration screen will display C-Limit. When the alarm finishes its cycle press the Power Mode button once. Perform a fresh air adjustment by pressing and holding the Air button. Release the Air button when prompted by the display. The only sensor that should have a reading is the oxygen sensor which should read 20.9%, the other sensors should all read zero. Stop if the oxygen display is not 20.9 or if any of the other sensors display a value other than zero the unit is not working properly contact the Safety Director. Initial: _____

Bump Test Procedure for the GX-2009
Locate the calibration gas cylinder, the regulator/valve assembly and the flow plate with the rubber tubing attached. Clip the flow plate onto the bottom of the unit, insure it is properly seated. Attach regulator/valve assembly to the gas cylinder (hands or finger tight only no tools) ensuring the valve is properly seated. Attach the hose from the flow plate to the regulator assembly. Slowly open the regulator assembly valve; just crack it a little bit. Each of the four sensors should begin to change states. The oxygen level should decrease and the other three should increase. Within a few seconds the unit should begin to alarm; audible, visual and vibrate. Record the values of each sensor and compare them to the values on the label of the gas cylinder. Ensure that each sensor has properly responded to the calibration gas and has passed the bump test. Close the regulator assembly valve. The audible and visual alarms will not reset until the sensors are below the warning level. Remove the flow plate and connect the GX-2009 to the RP-2009 unit; ensure units are properly seated together. Turn on the pumping unit. A few seconds after the pumping unit is turned on the gas concentrations will begin to dissipate after a minute all of the sensors should return to normal levels. Once at normal levels the alarms can be reset by pressing the power mode button on the GX-2009. Remove the tubing from the regulator assembly. Disconnect the regulator assembly from the cylinder. Return all materials to the orange carry case. Initial: _____

Sampling Techniques
Vapor and gasses all have differing weights which will determine where they are present within the space. Testing in incremental intervals will ensure all contaminants are detected. When working in a confined space, air monitoring should be conducted in layers. Starting at 18" from the top and dropping 4 feet in depth (in 4 foot intervals) until you reach the bottom of the space. The space shall be tested continuously throughout the entire operation. Initial: _____

Baseline/Air Sampling Log
Record the information from the baseline assessment on the air sampling log. Air sampling logs are kept in the orange case and on the "S" drive. Record the air sampling data on the air sampling log before entering the space and every 30 minutes until the work is complete and everyone is out of the space. Initial: _____

Alarms
If the sampling unit alarms for any reason get everyone out of the space and into a known safe area. Contact the Safety Director and cordon off the space to prevent others from entering it. Do not re-enter the space without written permission from the Safety Director. Initial: _____

Shut down (end of shift)
After each use the units (both of them) must be returned to the orange carry case and the GX-2009 should be placed on the charging station to ensure it is ready for the next use. Initial: _____

Summary
Workers cannot rely on their sense of smell to alert them to odorless hazards, necessitating the use of gas detectors whenever a worker enters an area with potential atmospheric hazards. Air sampling instruments are designed to protect personnel from unseen hazards that may exist in workplace environments, including confined spaces. Bump testing is the only way to confirm the air monitor is working properly. Bump testing must be performed every day before entering the suspect area. Units that fail the bump test must be taken out of service immediately; work must stop until a replacement unit can be placed into service. Results of the air sampling must be recorded on the air sampling log. If the sampling unit alarms for any reason get everyone out of the space and into a known safe area.

I understand the requirements for bump testing/air monitoring devices and that failure to maintain these expectations will lead to disciplinary actions up to and including dismissal from the jobsite or termination.

Bump Test/Air Sampling Training
Proof Testing for Air Monitors (4 in 1 Gas Detectors)

Name: _____ Company: _____ Date: _____

Print Name: _____ Signature: _____

Confined Space Air Sampling Log **Space/Location: _____**

Date: _____Name: _____ Signature: _____

Time	Oxygen 02	Methane CH4	Hydrogen Sulfide H2S	Carbon Monoxide CO	Time	Oxygen 02	Methane CH4	Hydrogen Sulfide H2S	Carbon Monoxide CO

Notes: