

Garmong Construction Services					
<i>EMPLOYEE SAFETY POLICY HANDBOOK – Confined Space</i>					
Last Revised:	January 24, 2012	By	Douglas Mahurin, MS, CSP	This Copy Printed:	1/24/2012 7:02:00 PM

CONFINED SPACE

Restricted Work Areas

For restricted work areas which lack the potential of creating a prohibited or unacceptable condition a Work Permit and Confined Space Entry Permit are not required (*identification and/or labels for these areas are not required*).

General Confined Space Entry Information

- Work Authorization Permit form and Confined Space Entry Permit Form will be filled out and posted at the entry site of all confined spaces.
- JSA and permits will contain all information regarding pre-entry preparation and hazard control.
- Work authorization and permits will be issued for the time required to perform the identified task.
- Work authorization/JSA and permits will be kept at the jobsite for the duration of the job. If circumstances cause an interruption in the work or a change in the atmospheric conditions of the space resulting in the alarm settings to be met or exceeded for which entry was approved a new work authorization / JSA and confined space entry permit must be completed.

Training

Responsibilities/Accountabilities: Project Manager/Superintendent

- All employees (e.g. Authorized Entrants, Attendants, Entry Supervisors, etc.) who are involved in all confined space entry operations will be trained in all aspects of this procedure, and the roles and responsibilities of all participants prior to working in a confined space activity.
- Employees shall be trained in associated procedures and programs, (e.g. Work Authorization / Job Safety Analysis, Lockout/Tagout TOP, Personal Protective Equipment TPP, Portable Gas Detection of the Atmosphere, etc.) required for confined space entry.
- Refresher training shall be conducted annually or more frequently if program changes have occurred.
- Where atmospheric conditions are not Immediately Dangerous to Life and Health (IDLH). Intermediate Confined Space Entry training is required prior to entering a Confined Space.
- Where atmospheric conditions are or potentially become (IDLH) Self Contained Breathing Apparatus (SCBA). Advanced Confined Space Entry training is required prior to entering a Confined Space.
- Advanced Confined Space Entry training is required prior to entering a Confined Space.
- On-site rescue teams will be trained initially and then annually thereafter, as well as perform annual drills.

Evaluate and Post Warning Signs

Responsibilities/Accountabilities: Project Manager/Superintendent

Inspect all areas designated as confined spaces annually and confirm appropriate signage is in place:

- Develop a list of confined spaces using the confined space inventory form, update the list annually and review with all site employees;
- Maintain the list of confined spaces in the central file and post at the plant or facility; and

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- Post a warning sign at the point of access / egress to the confined space. Ensure the sign is maintained and legible.

Conduct Work Authorization / Job Safety Analysis

Responsibilities/Accountabilities: Authorized Entrant / Attendant / Entry Supervisor

- Conduct a job safety analysis;
- Identify the Work Authorization Issuer and Receiver;
- Identify the Confined Space Permit Issuer.
- **Note: At a minimum, the workers should evaluate and discuss the following prior to confined space entry:**
 - ☑ Description of work to be performed and equipment to be used;
 - ☑ Identification and limitations of the confined space entry covered by the work authorization;
 - ☑ Code of practice or site specific plan (e.g. JSA) for the opening of the confined space and its isolation and preparation prior to entry;
 - ☑ Tests required prior to, during the entry, and while performing work in the confined space. Also include a written record of the test results;
 - ☑ Re-testing requirements (i.e., conditions requiring re-testing and tests needed);
 - ☑ Authorization start and end time;
 - ☑ Approvals required for entry;
 - ☑ Special work procedures and limitations;
 - ☑ Training requirements for personnel associated with the confined space entry;
 - ☑ Identification of hazards and/or energy sources (i.e. gas, electrical, liquid) to be eliminated (zero energy);
 - ☑ Methods for control of hazards (i.e. ventilation, PPE);
 - ☑ Emergency response plan including rescue procedures and equipment; and
 - ☑ Communication requirements;
 - ☑ High pressure cylinders and welding machines are to be located outside of a confined space.

Determination of Work Authorized / Permit or Non Work Authorized/ Permit Entry Confined Spaces

Responsibilities/Accountabilities: Authorized Entrant / Attendant / Supervisor.

- All Confined Spaces must be classified using the Job Safety Analysis.
- Upon completion of the analysis and risk estimation the Confined Space may be classified as; Restricted Work Areas, Minor, Serious, Major or Critical.
- In the event the space is classified as Restricted or Minor then there is no necessity for the issuance of a Work Authorization / Permit unless the work activities being introduced into the Confined Space elevates the hazards to Serious or higher.
- Confined Spaces classified as Restricted Work Areas or Minor may be entered without an Attendant present.
- **Note: Confined spaces that have any of the following characteristics, after hazard elimination, are at all times a Work authorization and Permitted required confined space:**
 - If there is a reasonable potential of a serious hazard reoccurring in the space or developing in the space by any means including the work process;
 - If the space contains or has the potential to contain a hazardous atmosphere during the time of the entry;
 - If the space contains any serious safety or health hazard;

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- Contains material that has the potential for engulfing an entrant;
- 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;
- If the entry of the space or its internal configuration is such that an outside rescue or entry rescue may be required.

Pre-Entry Requirements

Isolate / Lockout / Tagout

- **NOTE: This section is applicable only if energized equipment and / or energized sources associated with the confined space and if so the Lockout / Tagout Procedure must be followed.**

Responsibilities/Accountabilities: Isolation Coordinator

- Lockout and Tagout energized equipment and or energized sources.
- Discharge and/or isolate other sources of energy (e.g. mechanical, hydraulic, spring loaded, gravitational, switching & tagging).
- Take measures to prevent hazardous materials from entering the confined space (i.e. blanking, blinding, double valving with an intermediary bleed or physically disconnecting the source piping).

Decontaminate Space

Responsibilities / Accountabilities: Attendant / Work Authorization Receiver

- Remove all hazardous liquids or free flowing solids from the confined space:
 - Review applicable material safety data sheets;
 - Test atmosphere, solids and/or liquids;
 - Determine appropriate waste disposal and hazard control methods;
 - Empty vessels of residual material by draining or pumping out material, and make clean by hot or cold water flushing, steaming, chemical neutralization, inert gas and/or air purge or other TC approved procedures;
 - Purge with inert gases (e.g. nitrogen) if the space last contained flammable substances. Ventilate to prevent flammable atmospheres from developing.
- Take precautions to prevent spontaneous / inadvertent ignition of process materials. Follow self-grounding methods if determined in the job safety analysis for your task.
- Methods may include:
 - Discharge static from the body before entering a potentially explosive atmosphere;
 - Use spark resistant tools;
 - Use explosion proof intrinsically safe equipment as required ie. Class 1, Div 2; and/or
 - All electrical equipment will be used with Ground Fault Circuit Interrupter (GFCI).

Test Atmosphere

Responsibilities/Accountabilities: Attendant / Authorized Entrant / Entry Supervisor

- **NOTE:** No workers are allowed to enter a confined space until atmospheric testing is completed and atmospheric airborne levels found to be acceptable. Pre-entry atmospheric testing must be done from outside the space if possible. If the space needs to be entered in order to complete atmospheric testing, all

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provisions of a permit entry are to be in place until atmospheric tests confirm that a space may be re-classified to a non permit entry space.

- **All confined spaces shall be tested prior to entry and continuously monitored during entry. Any worker entering the space shall be provided the opportunity to observe the pre-entry atmospheric monitoring. The atmosphere in the space must be retested before re-entry, if the space is vacated for a period of time in which the conditions in the space may change (e.g. Lunch break or shift change).**
- Testing must be conducted with a calibrated, direct reading instrument which is capable of continuous monitoring, and performed in the following order:
 - 1) Oxygen content;
 - 2) Combustible gases (e.g., methane);
 - 3) Other potential atmospheric hazards (e.g., carbon monoxide and hydrogen sulfide).
- Test the whole space, at the various levels or layers within the space, recognizing that gas and oxygen concentrations may vary within the space:
Where possible, monitor with covers in place (e.g. manhole covers) to prevent exposure;
Only competent personnel are permitted to perform the atmospheric tests.
- Record the results on the Portable Gas Detector Monitoring Measurements Form or Confined Space Entry Permit. Use the highest or most alarming level observed while conducting the above 3 tests.
- Ensure tests results **meet** the following entry requirements:
The oxygen concentration is not less than 19.5% and not more than 23.5% by volume.
Concentration of explosive gases is not above 10% of the Lower Explosive Limit (LEL);
The level of toxic substances present is not above Action Level of the Threshold Limit Value (TLV), Permissible Exposure Limits (PEL), or Occupational Exposure Limits (OEL) whichever is most stringent.
- If any of the test results are unacceptable:
determine the source of the contaminant;
ensure the space is ventilated mechanically (minimum of 10 minutes);
ensure the space is naturally ventilated for an additional 10 minutes; and
repeat the atmospheric tests.
- Suspend all work if the second test identifies an atmospheric hazard still exists.
Review work plan and atmospheric test results with leader or designate to determine if work in the confined space is essential.
- Record the name of each confined space authorized entrant, the location of the space, and the time at which the entrant enters and exits the confined space on the Confined Space Entry Permit or Confined Space Entrant Record Form.
- In the event of an alarm while the confined space is occupied, immediately vacate the space and shut down all ignition sources if applicable. Determine the source of the hazard and initiate all steps of confined space entry procedure needed to evaluate and eliminate the hazard. This may include re-evaluation of risk and control measures and re-issuing the JSA and confined space entry permit.

Ventilate

Responsibilities/Accountabilities: Attendant / Authorized Entrant

- Provide positive ventilation where the potential exists for the generation of toxic, explosive, or flammable vapours/gases (e.g. in the application of tank linings, cleaning a tank or welding in vessels).
It may be required to implement local exhaust ventilation to reduce worker exposure.

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- Ventilate the confined space utilizing positive mechanical ventilation to ensure contaminants are not introduced into the confined space nor does the exhaust generated pose a fire and/or health hazard for workers.
- Ensure the ventilation equipment is:
 - Equipped with an audible or visible alarm (e.g. use plastic flagging as a visible indicator of blower unit operation);
 - Continuously monitored by an employee;
 - Intrinsically safe.
 - Grounded as per manufacturers specifications if applicable

Determine PPE Requirements

Responsibilities/Accountabilities: Attendant / Authorized Entrant

- Determine if additional personal protective equipment is required (e.g. respiratory protective equipment, flame resistant clothing, etc.) based on ventilation, test results and materials and / or substances which may exist or potentially exist in the confined space.

Establish and Maintain Safety Support

Responsibilities/Accountabilities: Attendant / Authorized Entrant(s) / Designated Safety Support

- Establish and maintain a communication system between the attendant(s) and the entrant(s) in the confined space.
- Establish and maintain a communication method between the attendant(s) and support help.
- Support help **must** consist of one (1) or more additional attendants when the risks associated with the confined space increases (e.g., greater number of workers inside, atmospheric conditions, etc.). These workers (i.e., support help) must be made aware of the job scope and their responsibilities in the event emergency response is required.

Rescue Services

Responsibilities/Accountabilities: Work Authorization Receiver / Attendant

- Rescue services must be coordinated ahead of time and may be provided by on-site employees or an off-site service for any site that has permit required confined spaces.
- All internal or external rescue teams must be competent and shall be trained in rescue and have conducted practice rescue scenarios at least annually.
- Non-entry rescue shall be used whenever possible. A mechanical retrieval device shall be used for non-entry rescue if the vertical space is more than 5ft (1.5m) in depth and the retrieval equipment does not increase the hazard to the entrants.
- Ensure procedures and equipment capable of affecting an external rescue of all entrants are available for immediate use.
- Position all emergency response equipment required for external rescue, including the necessary first aid supplies at the access / egress to the confined space.
- In the event that outside rescue services are required:
 - Verify competency of outside service providers (e.g. certification / qualification in Confined Space);

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- Verify certification / qualification in first aid / CPR, airborne monitoring equipment;
- Determine the response time of outside emergency services (i.e. fire, rescue, medical) prior to entry. Ensure that they will be able to respond as required during the entry;
- Obtain a written agreement detailing services to be provided;
- Their status is part of your emergency response plan and it should be known at all times during the entry;
- For confined spaces, which are or may become immediately dangerous to the life or health (e.g., reduced oxygen content of the air, acute toxic effects caused by contaminants, etc.), the rescuer(s) shall wear self-contained breathing apparatus or a remote supplied air;
- Outside rescue services must be made aware of the hazards of the confined spaces, must have access to comparable permit entry confined spaces; or afforded the opportunity to practice at the facility where they will be doing the rescue in order to develop rescue plans and practice rescues.

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Confined Space Entry Requirements

Issue Work Authorization and Confined Space Entry Permit

Responsibilities/Accountabilities: Work Authorization and Permit Issuer; Project Manager

- Review the job site identified in the work authorization with the work authorization receiver.
- Explain all job hazards to the work authorization receiver to ensure the receiver clearly understands all of the hazards, risks, limitations and safety requirements associated with the proposed work as documented.
- Explain that the work authorization receiver will be responsible to ensure all identified hazards have appropriate risk control measures in place and implemented.
- Confirm that the work authorization receiver understands each job hazard, each risk control measure, and the reason for each risk control measure.
- Confirm that the work authorization receiver understands the Emergency Response Plan.
- Sign off on the work authorization for agreement.
- Issue the work authorization for a maximum duration of 10 consecutive days. A new authorization must be issued for jobs exceeding 10 consecutive days unless a variance has been granted.
- The work authorization is valid only within the Region which issued the authorization (Each confined space entry will have a separate WA/JSA and entry permit).
- There is no "Transfer of Ownership/Authority". If an issuer or receiver leaves the site (e.g. during shift change, etc.), they must ensure that any personnel coming on site to replace them (i.e., new Issuer / Receiver Designate) is informed of the details of the work authorization, is aware of any changes which may have occurred during the time they were on site and share any JSAs which had been developed. The new receiver designate is responsible for informing the new shift of workers of the details discussed.
- Issue a new work authorization and permit if the scope of the work changes.
- Post or have readily accessible at the work site, the work authorization / JSA.
- Complete Work Authorization / Job Safety Analysis and Confined Space Entry Permit and post at the entrance of the confined space.

Perform Job Task

Responsibilities/Accountabilities: Work Authorization and Permit Receiver / Entry Supervisor / Attendant

- Conduct all pre-entry evaluation, testing and hazard controls of the confined space with the Work Authorization Issuer / Confined Space Entry Permit Issuer to ensure that all aspects of the work authorization / confined space permit are complete before anyone enters the space.
- If the space has been reclassified as a non permit entry, use side A of the Confined Space Work Authorization and Entry Permit form to document the information for reclassification and post at the confined space entrance.
- If the confined space is a permit entry confined space, complete all sections of the confined space entry permit and post at the entrance of the confined space for the duration of the work.
- Ensure attending personnel and authorized entrant(s) are competent and knowledgeable in their duties.
- Where applicable, ensure that barricades or other protection is used to prevent persons, equipment, tools and / or debris from falling in to the confined space.

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- Ensure gas and oxygen levels are continuously monitored and recorded while the confined space is occupied. Depending on the situation, this monitoring may be performed by the personnel entering the confined space or by the attendants.
- If conditions are suspected to have changed, stop work and evacuate the area immediately until the entry supervisor has been notified and has given authorization for the work to continue.
- **The atmosphere in the space must be retested before re-entry, if the space is vacated for a period of time in which the conditions in the space may change (eg. Lunch break or shift change).**
- **If at any time, irritation of the eyes, nose, throat or skin, difficulty in breathing, headaches, dizziness or ringing of the ears are experienced, all employees must leave the area and notify the designated Representative immediately.**

Contact Safety Resources

- Attendant must never enter a confined space unless relieved by another competent / qualified attendant.
- Maintain communication with the entrant(s) and support help.
- Communicate any change in working conditions with the entrant(s) in the confined space and with support help.
- Monitor all life support systems in use during the confined space entry.
- Be prepared to have the confined space evacuated immediately in the event that entry conditions are no longer acceptable.
- Perform non entry rescues.
- Initiate emergency response and summon outside rescue services if needed.
- In the event the receiver / attendant must leave the site (e.g. during shift change, etc.), he / she must ensure that any personnel coming on site to replace them is informed of the details of the JSA and confined space entry permit, is aware of any changes which may have occurred during the time they were on site and share / communicate all JSAs which had been developed. The new receiver / attendant is responsible for informing the new shift of workers the details discussed.

Ensure all personnel are accounted for when the work is completed or suspended.

Return original copies of the work authorization and permit to the issuer for sign off when the work is complete or when a new work authorization or permit is required.

Responsibilities/Accountabilities: Authorized Entrant

- The entrant must be aware of the hazards and controls associated with the confined space.
- **The entrant must exit the space as soon as possible when ordered by the attendant or symptoms of exposure exist.**
- **Do not:**
Take high-pressure cylinders, (other than those on air supplied respirators) or welding machines into a confined space.

Records Retention

Responsibilities/Accountabilities: Entry Supervisor/ Safety Director

- Permits / Work Authorizations / JSAs and calibration records must be retained for one year in the facility file.

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Annual Review

- Review/evaluate the confined space program annually. This would include, but not necessarily be limited to, an evaluation of:
 Thoroughness of the WA/JSAs and confined space entry TOP and permits.
 Effectiveness of training
 Condition of signing

Definitions

<i>Action Level</i>	Generally ½ of the Permissible Exposure Level or Threshold Limit Value unless specified.
<i>Attendant</i>	Personnel involved in a confined space entry, competent in the following: use of required protective equipment, emergency response and rescue procedures, cardiopulmonary resuscitation, automatic external defibrillator, and first aid. And at no time is the Attendant to enter the Confined Space or leave the entry- point of the Confined Space until such time he / she is replaced by another competent Attendant.
<i>Authorized Entrant</i>	A worker designated and authorized by the employer or the employer’s representative to enter into that employer’s confined space.
<i>Competent</i>	Adequately qualified, suitably trained and with sufficient experience to safely perform work as outlined, without or with only a minimal degree of supervision.
<i>Confined Space</i>	<p>An enclosed or partially enclosed space having restricted entry /access and exit / egress, and which, due to its design, construction, location, atmosphere, contents, work activities or other conditions, is or may become hazardous to an employee required to enter.</p> <p>Confined Space further means:</p> <ol style="list-style-type: none"> 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; and 3) Is not designed for continuous employee occupancy; and <p>Confined spaces may include but are not limited to:</p> <ul style="list-style-type: none"> - dry wells more than 4 feet in depth; - meter stations; - compressor auxiliary buildings - air intake flue; - sumps; - boilers; - tanks; - silos - storage bins; - hoppers; - vaults; - pits; - hoppers;

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limited means of access and egress.

A space which has a limited means of entry or exit if an entrant's ability to escape in an emergency would be hindered.

Restricted Work Area

A work area which poses no hazard to an employee more serious than a minor restricted means of access and egress.

Upper Explosive Limit (UEL)

Upper limit of flammability or explosiveness of a gas or vapor, at ordinary ambient temperatures and pressures, expressed as a percentage of gas or vapor in air, by volume. A gas is combustible only between its LEL and UEL.

Valid Work Permit

Valid only for the person to which the Permit was issued and valid only for the duration during which the Permit was issued. The Permit automatically expires when:

- Work is complete;
- The duration on which the Permit was issued expires; and
- When the location is evacuated due to an emergency situation.

Note: Any Work Permit for confined space must be re-issued and area retested after an evacuation.

Work Permit

Issued to cover a predetermined time interval for performing specific on-site controlled work.

Work Permit Issuer

The designated representative responsible for performing the checks and tests necessary to identify existing or potential hazards, and complete the required Work Permit.

Work Permit Receiver

The person who reviews the identified hazards with the Work Permit Issuer, and signs the Permit on behalf of the personnel performing the work covered by the Permit.

Zero Energy

When all sources of energy (e.g. electrical, mechanical, compressed gas, spring tension) are isolated or effectively blocked, and all sources of stored energy are depleted and confirmed.