

Example Confined Space Entry Programs

Use with the Confined Spaces book, Chapter 296-809 WAC

These example confined space entry programs are provided for your information, and to help you determine the information needed for your program.

To develop an effective program for your facility or work environment, you will need to identify work conditions both typical to your industry and unique to your workplace. You also need to consider other rules. For a list of rules in other chapters that cover confined spaces, see the Resources section of the Confined Spaces book.

Example Confined Space Entry Program for Sewer Entry

The sections that follow apply only to permit-required confined space entry. The information on alternate entry has been identified with a title.

POTENTIAL HAZARDS

Check the boxes after you have reviewed your workplace for these hazards.

Employees could be exposed to the following:

- Engulfment and drowning**
- Presence of toxic gases**
Equal to or more than 10 ppm hydrogen sulfide measured as an eight-hour time-weighted average. If the presence of other toxic contaminants is suspected, specific monitoring programs will be developed.
- Presence of explosive/flammable gases**
Equal to or greater than ten percent of the lower flammable limit (LFL)
- Oxygen deficiency**
A concentration of oxygen in the atmosphere equal to or less than 19.5% by volume.

ENTRY PERMITS

Review the information in this section.

- All sewers are considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise.
- Any employee required or permitted to pre-check or enter a sewer has successfully completed, at a minimum, the training outlined in our training procedures.
- A written copy of operating and rescue procedures as required by these procedures is at the worksite for the duration of the job.
- The sewer entry permit is completed before approval can be given to enter a sewer.
- The permit verifies completion of items required to protect employees.
- The permit is kept at the job site for the duration of the job.
- If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new sewer entry permit needs to be completed.

CONTROL OF ATMOSPHERIC AND ENGULFMENT HAZARDS

Review the information in this section.

Surveillance

- The surrounding area is surveyed to avoid hazards such as drifting vapors from tanks, piping, or sewers.

Testing

- The sewer atmosphere is tested to determine whether dangerous air contamination or oxygen deficiency exists.
- A direct reading gas monitor is used.
- Testing is performed by a supervisor who has successfully completed the gas detector training for the monitoring method used.
- The minimum parameters to be monitored are oxygen deficiency, Lower Flammable Level (LFL), and hydrogen sulfide concentration.
- A written record of the pre-entry test results is made and kept at the worksite for the duration of the job.
- Affected employees are able to review the testing results.
- The most hazardous conditions will determine when work is being performed in two adjoining, connected spaces.

Space ventilation

- Mechanical ventilation systems, where required, are set at one hundred percent of the outside air.
- Where possible, open additional manholes to increase air circulation.
- Use portable blowers to increase natural circulation if needed.
- After a suitable ventilation period, repeat the testing.
- Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated or controlled.

ENTRY PROCEDURES

Review the information in this section.

Table HT-1
Entry Procedures for Confined Space Conditions

If you have any of the following conditions	Then follow these procedures
Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels	<ul style="list-style-type: none">- All personnel are trained- A self-contained breathing apparatus is worn by any person entering the sewer.- At least one worker stands by the outside of the sewer ready to give assistance in case of emergency.- The rescue workers has a self-contained breathing apparatus available for immediate use.- There is at least one additional worker within sight or call of the standby worker.- Continuous powered communications is maintained between the worker within the sewer and standby personnel.
The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop	
It is not feasible to provide for immediate exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems	
An emergency exists and it is not feasible to wait for pre-entry procedures to take effect	

ALTERNATE ENTRY

Review the information in this section.

Certification

- Sewers may be entered without the need for a written permit or attendant if the space can be maintained in a safe condition for entry by mechanical ventilation alone.
- All sewers are considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise.
- Any employee required or permitted to pre-check or enter a sewer will have successfully completed, at a minimum, the training outlined in our training procedures.
- A written copy of operating and rescue procedures as required by these procedures needs to be at the worksite for the duration of the job.
- The sewer pre-entry checklist is completed by the lead worker before entry into a sewer. This list verifies completion of items listed below. This checklist is kept at the job site for the duration of the job.

- If circumstances dictate an interruption in the work, reevaluate the sewer and complete a new checklist .

Control of atmospheric and engulfment hazards

- Pumps and lines:
 - All pumps and lines which may reasonably cause contaminants to flow into the sewer are disconnected, blinded, and locked out, or effectively isolated by other means to prevent development of dangerous air contamination or engulfment.
 - Not all lateral lines to sewers or storm drains require blocking. However, where experience or knowledge of use indicates a reasonable potential for contamination of air or engulfment into an occupied sewer, then all affected lateral lines are to be blocked.
 - If blocking or isolation requires entry into the sewer, the provisions for entry into a permit-required confined space are implemented.
- Surveillance:
 - The surrounding area is surveyed to avoid hazards such as drifting vapors from the tanks, piping, or sewers.
- Testing:
 - The atmosphere within the sewer will be tested to determine whether dangerous air contamination or oxygen deficiency exists.
 - Detector tubes, alarm only gas monitors, and explosion meters are examples of monitoring equipment that may be used to test sewer atmospheres.
 - Testing is performed by a lead worker who has successfully completed the gas detector training for the monitoring method to be used.
 - The minimum parameters to be monitored are oxygen deficiency, LFL, and hydrogen sulfide concentration.
 - A written record of the pre-entry test results are made and kept at the worksite for the duration of the job.
 - The supervisor will certify in writing, based upon the results of the pre-entry testing, that all hazards have been eliminated or controlled.
 - Affected employees are able to review the testing results.
 - The most hazardous conditions will determine when work is being performed in two adjoining, connecting spaces.

Entry procedures

When entering without permit or an attendant, entry into and work within may proceed if:

- There are no non-atmospheric hazards present
- The pre-entry tests show there is no dangerous air contamination or oxygen deficiency within the space; and there is no reason to believe that any is likely to develop

- Continuous testing of the atmosphere in the immediate vicinity of the workers within the space is accomplished
- Workers will immediately leave the sewer when any of the gas monitor alarm set points are reached as defined
- Workers will not return to the area until a supervisor who has completed the gas detector training has used a direct reading gas detector to evaluate the situation and has determined that it is safe to enter.
- If you are entering a space without a permit or an attendant
 - Arrangements for rescue services are not required for entries that do not require a permit.
 - See the “rescue” section for instructions regarding rescue planning where an entry permit is required.

RESCUE

- Review the information in this section and check the boxes that apply.
 - Call the local rescue services for rescue.
 - Rescue entries into sewers are made only by trained and properly equipped personnel.
 - If immediate hazards to injured personnel are present, workers at the site implement emergency procedures without entering the sewer.
 - Continuous gas monitoring is performed during all sewer entry operations. If alarm conditions occur, entry personnel exit the sewer and a new sewer entry permit is issued.
 - When dangerous air contamination is attributable to flammable or explosive substances, lighting and electrical equipment needs to be Class 1, Division 1 rated per National Electrical Code (NEC) and no ignition sources may be introduced into the area.
 - When it is practical, the full-body harness is used to suspend a person upright and a hoisting device or similar apparatus is available for lifting workers out of the sewer.
 - If at any time the use of a hoisting device or full-body harness and attached lifeline may endanger the worker, their use may be discontinued.

- Review and follow the requirements for any of the situations in Table HT-2, Procedures for Removing Workers from Sewers.

**Table HT-2
Procedures for Safely Removing Workers from Sewers**

If	Then
There is any questionable action or non-movement by the worker inside	<ul style="list-style-type: none"> – Perform a verbal check. – Immediately remove the worker from the sewer if there is no response or a questionable response from them
The worker is disabled due to falling or impact	<ul style="list-style-type: none"> – Do not remove the worker from the sewer unless there is immediate danger to the worker's life. – Notify local rescue personnel immediately. – Make sure the standby worker doesn't enter the sewer in this case. <ul style="list-style-type: none"> ▪ Only trained rescue personnel (wearing self contained breathing apparatus-SCBA) may enter to perform a rescue. – Make sure all workers entering the space use a full-body harness with attached lifeline with the free end of the line secured outside the entry opening. – Make sure the standby worker uses the lifeline to attempt to rescue a disabled worker without entering the space and summons rescue services based on their assessment of the situation.

Example Confined Space Entry Program for Meat and Poultry Rendering Plants

Cookers and dryers are horizontal, cylindrical vessels equipped with a center, rotating shaft and agitator paddles or discs. If the inner shell is jacketed, it is usually heated with steam at pressures up to 150 psig (1034.25 kPa). The rotating shaft assembly of the continuous cooker or dryer is also steam heated.

Cooker and dryer operations can be either batch or continuous. Multiple batch cookers are operated in parallel. When one unit of a multiple set is shut down for repairs, make means available to isolate that unit from the others which remain in operation.

POTENTIAL HAZARDS

Check the boxes after you have reviewed your workplace for these hazards.

The recognized hazards associated with cookers and dryers include the risk that employees could be:

- Struck or caught by rotating agitator.
- Engulfed in raw material or hot, recycled fat.
- Burned by steam from leaks into the cooker/dryer steam jacket or the condenser duct system if steam valves are not properly closed and locked out.
- Burned by contact with hot metal surfaces, such as the agitator shaft assembly, or inner shell of the cooker/dryer.
- Subjected to heat stress caused by warm atmosphere inside cooker/dryer.
- Injured by slipping and falling on grease in the cooker/dryer.
- Electrically shocked by faulty equipment taken into the cooker/dryer.
- Burned or overcome by fire or products of combustion.
- Overcome by fumes generated by welding or cutting done on grease covered surfaces.

Permits

- The supervisor is always present at the cooker/dryer or other permit entry confined space when entry is made.

- The supervisor:
 - Follows the pre-entry isolation procedures described in the entry permit when preparing for entry,
and
 - Makes sure the protective clothing, ventilating equipment, and any other equipment required by the permit are at the entry site.

- The permit specifies how isolation is accomplished and any other preparations needed before making entry. This is especially important in parallel arrangements of cooker/dryers so you don't have to shut down the entire operation to allow safe entry into one unit.

CONTROL OF HAZARDS

Check the boxes that apply after you have addressed the hazards below.

Mechanical

- Lock out main power switch to agitator motor at main power panel.
- Affix tag to the lock to inform others that a permit confined space entry is in progress.

Engulfment

- Close all valves in the raw material blow line.
- Secure each valve in its closed position using chain and lock.
- Attach a tag to the valve and chain warning that a permit confined space entry is in progress.
- The same procedure is used for securing the fat recycle valve.

Burns and heat stress

- Close steam supply valves to jacket and secure with chains and tags.
- Insert solid blank at flange in cooker vent line to condenser manifold duct system.
- Vent cooker/dryer by opening access door at discharge end and top center door to allow natural ventilation throughout the entry.
- If faster cooling is needed, use a portable ventilation fan to increase ventilation.
- Cooling water may be circulated through the jacket to faster reduce both outer and inner surface temperatures of cooker/dryers.
- Check air and inner surface temperatures in cooker/dryer to assure they are within acceptable limits before entering, or use proper protective clothing.

Fire and fume hazards

- Careful site preparation, such as cleaning the area within four inches (10.16 cm) of all welding or torch cutting operations, and proper ventilation are the preferred controls.
- All welding and cutting operations are required to be done based on WISHA's Welding standard, chapter 296-24 WAC, Part I, Welding, cutting, and brazing (found in another book).
- Proper ventilation may be achieved by local exhaust ventilation, or the use of portable ventilation fans, or a combination of the two practices.

Electrical shock

- Electrical equipment used in cooker/dryers needs to be in serviceable condition.

Slips and falls

- Remove residual grease before entering cooker/dryer.

Attendant

- The supervisor is the attendant for employees entering cooker/dryers.

Rescue

- When necessary, the attendant calls the employer's trained rescue team or the local fire services as previously.

Example Confined Space Entry Program for Workplaces where Portable Tanks are Fabricated or Serviced

During fabrication

These tanks and dry-bulk carriers are entered repeatedly throughout the fabrication process. These products are not configured identically, but the manufacturing processes by which they are made are very similar.

Sources of hazards

In addition to the mechanical hazards arising from the risks that an entrant would be injured due to contact with components of the tank or the tools being used, there is also the risk that a worker could be injured by breathing fumes from welding materials or mists or vapors from materials used to coat the tank interior. In addition, many of these vapors and mists are flammable, so the failure to properly ventilate a tank could lead to a fire or explosion.

Control of hazards

- Welding
 - Use local exhaust ventilation to remove welding fumes once the tank or carrier is completed to the point that workers may enter and exit only through a manhole. (Follow the requirements of chapter 296-24 WAC, Part I, Welding, cutting and brazing, found in another chapter).
 - Don't ever bring welding gas tanks into a tank or carrier that is a permit entry confined space.
- Application of interior coatings/linings
 - Control atmospheric hazards by forced air ventilation sufficient to keep the atmospheric concentration of flammable materials below ten percent of the lower flammable limit (LFL) (or lower explosive limit (LEL), whichever term is used locally).
 - Provide the appropriate respirators and use them in addition to providing forced ventilation when the forced ventilation doesn't maintain acceptable respiratory conditions.

Permits

Because of the repetitive nature of the entries in these operations, an "area entry permit" will be issued to cover production areas where tanks are fabricated so that entry and exit are through manholes.

Authorization

Only the area supervisor may authorize an employee to enter a tank within the permit area. The area supervisor determines that conditions in the tank trailer, dry-bulk trailer, or truck, for example, meet permit requirements before authorizing entry.

Attendant

- The area supervisor designates an employee to maintain communication by employer specified means with employees working in tanks to make sure they're safe.
- The attendant may not enter any permit confined space to rescue an entrant or for any other reason, unless authorized by the rescue procedure and, and even then, only after calling the rescue team and being relieved by an attendant by another worker.

Communications and observation

- Communications between the attendant and entrants has to be maintained throughout entry.
- Methods of communication that may be specified by the permit include voice, voice-powered radio, tapping or rapping codes on tank walls, and signaling tugs on a rope.
- The attendant's need to observe the work activities such as chipping, grinding, welding, spraying, for example, that require deliberate operator control to make sure they continue normally.
- These activities often generate so much noise that the necessary hearing protection makes communication by voice difficult.

Rescue Procedures

Acceptable rescue procedures include entry by a team of employee-rescuers, use of public emergency services, and procedures for breaching the tank.

- The area permit specifies which procedures are available, but the area supervisor makes the final decision based on circumstances.

Note:

Certain injuries may make it necessary to breach the tank to remove a person rather than risk additional injury by removal through an existing manhole.

- The supervisor makes sure that no breaching procedure used for rescue would violate terms of the entry permit.
- For example, if the tank has to be breached by cutting with a torch, the tank surfaces to be cut need to:
 - Be free of volatile or combustible coatings within four inches (10.16 cm) of the cutting line
and
 - The atmosphere within the tank has to be below the LFL.

Retrieval line and harnesses

- The retrieval lines and harnesses generally required under this rule are usually impractical for use in tanks. The internal configuration of the tanks and their interior baffles and other structures would prevent rescuers from hauling out injured entrants.

- However, unless the rescue procedure calls for breaching the tank for rescue, the rescue team needs to be trained in the use of retrieval lines and harnesses for removing injured employees through manholes.

REPAIR OR SERVICE OF “USED” TANKS AND BULK TRAILERS

Sources of hazards

In addition to facing the potential hazards encountered in fabrication or manufacturing, tanks or trailers which have been in service may contain residues of dangerous materials, whether left over from the transportation of hazardous cargoes or generated by chemical or bacterial action on residues of non-hazardous cargoes.

Control of atmospheric hazards

A “used” tank needs to be brought into areas where tank entry is authorized only after the tank has been emptied, cleansed of any residues without employee entry, and purged of any potential atmospheric hazards.

Welding

- In addition to tank cleaning for control of atmospheric hazards, coating and surface materials need to be:
 - Removed four inches (10.16 cm) or more from any surface area where welding or other torch work will be done
and
 - Make sure the atmosphere within the tank remains well below the LFL.
- Follow the requirements of chapter 296-24 WAC, Part I, Welding, cutting and brazing, found in a separate book, at all times.

Permits

- An entry permit needs to be issued prior to authorization of entry into used tank trailers, dry-bulk trailers, or trucks.
- In addition to the pre-entry cleaning requirement, this permit needs to require the employee safeguards specified for new tank fabrication or construction permit areas.

Authorization

- Only the area supervisor may authorize an employee to enter a tank trailer, dry-bulk trailer, or truck within the permit area.
- The area supervisor determines that the entry permit requirements have been met before authorizing entry.