Confined Space Entry Training for Decentralized Wastewater Workers

Safety and Health Investment Project (SHIP)

Written by The Washington On-Site Sewage Association, Funding and Support Provided by the Washington State Department of Labor and Industries

Washington On-Site Sewage Association

"Voice of the Industry"

"Safety in Your Workplace"

Confined Space Entry Training for Workers in the OSS Industry

SHIP Grant Program — Safety and Health Investment Projects — SafetyGrants.Lni.wa.gov

Funded by the Department of Labor & Industries

WOSSA CSE Program Recognition

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Funding and support for this project has been provided by the State of Washington, Department of Labor & Industries, Safety & Health Investment Projects

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Develop and Deliver an industry specific Confined Space Entry training program for the On-Site industry and workers that enter confined spaces.

Confined Space Entry Program Resources

Handout's for the class include:

- PowerPoint presentation
- CSE Training Handbook
  - Contains the WAC 296-809-100
  - Outlines what you must do
- CSE Training Resource
  - Tools for setting up your CSE program

How are the rules for Confined Space Entry set up?

Four Major Sections: WAC 296-809 – Confined Spaces

- Identify and Control permit-required confined spaces and inform employees
  - 5 sub-sections
- Develop a written permit-required confined space program
  - 3 sub-sections
- Provide employee training and certify their proficiency
  - 2 sub-sections
- Implement and use confined space entry permit procedures 19 sub-sections

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Class Agenda

- Discuss the rule requirements as they apply to CSE in the OSS industry in our state
- Discuss the roles of:
  - Entrant
  - Attendant
  - Supervisor

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- Review Examples of OSS Confined Spaces
  - Septic and Pump Tanks
  - Pump Trucks
  - Sewer lines
- Application of Confined Space rules to Excavations and Trenches
  - Tank Excavations
  - Trenches
  - Soil Log Test Pits

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- Review Personal Protective Equipment (PPE)
  - Selection
  - Fit for use
  - Maintenance
- Practice and demonstrate proficiency doing a confined space entry and using equipment.
  - Septic and Pump Tanks
  - Pump Trucks/Storage Tanks

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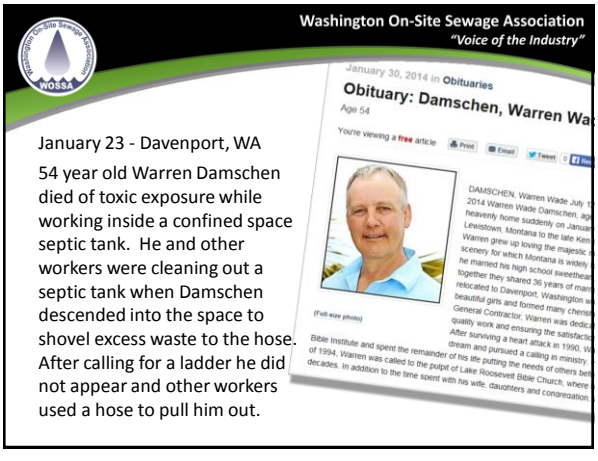
Left to their own devices, employee's will make decisions on their own



January 23 - Davenport, WA

54 year old Warren Damschen died of toxic exposure while working inside a confined space septic tank. He and other workers were cleaning out a septic tank when Damschen descended into the space to shovel excess waste to the hose. After calling for a ladder he did not appear and other workers used a hose to pull him out.

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Confined Space Hazards
PRCS Fatalities

- 47% Air (Oxygen, Gases, Vapors)
- 21% Drowning (Engulfment)
- 19% Toxic (Liquids, Vapors, etc above PEL)
- 10% Blunt Force Trauma
- 2% Electrocution (Mostly due to objects the victim took in with them)
- 1% Burns

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Confined Space Entry

Discuss the rule requirements as they apply to CSE in the OSS industry in our state

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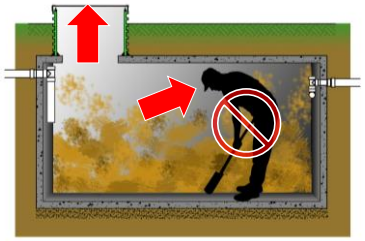
WAC 296-809-100

Confined Space

- A **Confined Space** is a space that has all of the following:
  - Large enough and arranged so an employee could fully enter the space and work.
  - Has limited or restricted entry or exit
  - Not primarily designed for human occupancy

WAC 296-809-100

- Large enough and arranged so an employee could fully enter the space and work.
- Not primarily designed for human occupancy
- Has limited or restricted entry or exit



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WAC 296-809-800

Confined Space **"Entry"**

- The action by which a person passes through an opening into a permit-required confined space and includes work activities in that space.
  - **Entry** is considered to have occurred as soon as **any part** of the entrant's body **breaks the plane** of an opening into the space.

WAC 296-809-800

Confined Space **"Entry"** (Con't)

- If the opening is large enough for the worker to fully enter the space**, a permit is required even for partial body entry.** Other rules such as chapter 296-803 WAC, lockout-tag-out, and chapter 296-841 WAC, Airborne contaminants, may apply
- Permits are not required for partial body entry where the opening is not large enough for full entry

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Types of Confined Space

- Permitted Confined Space Entry
- Alternate Entry Procedures
- Non-Permit Confined Space

WAC 296-809-200

Permitted Confined Space (a space with any ONE of the following)

- Contains or has a *potential* to contain a hazardous atmosphere
- Contains a material with engulfment potential
- Internal configuration that could cause one to be trapped or asphyxiated by inwardly converging walls or by a floor, which slopes downward and tapers to a smaller cross section.

Permitted Confined Space (a space with any ONE of the following)

- Contains any physical hazard, including health or safety hazards, engulfment in solid or liquids, electrical shock or moving parts.
- Any other recognized safety or health hazard that could either: impair self rescue or result in a situation that presents an immediate danger to life or health

Hazardous Atmosphere

- Before a permit space that may have a hazardous atmosphere can be entered, the atmosphere must be tested
  - Oxygen: Enriched or Deficient
  - Combustible Gasses (LEL): Methane; Hydrogen Sulfide
  - Toxic Gasses and Vapors (PEL): Hydrogen Sulfide
  - Pathogen Exposures

- **Breathing Zone:** Space around the entrants nose and mouth, forming a hemisphere with a 6-9" radius
- **Exposed or Exposure:** The contact an entrant has with a toxic substance, harmful physical agent or oxygen deficient condition, whether or not PPE provides protection. Exposure can occur through various routes of entry such as inhalation, ingestions, skin contact or skin absorption
- **Gas:** A normally formless fluid which can be changed to a liquid or solid state by the effect of increased pressure or decreased temperature or both
- **General Exhaust Ventilation:** The general movement of air out of an area or permit-required confined space by mechanical or natural means

Atmosphere

- **Immediately dangerous to life or health (IDLH)**:
  - An atmospheric condition that would cause:
    - An immediate threat to life
    - Cause permanent or delayed adverse health effects
    - Or, interfere with an employee's ability to escape
- **Mist**: Liquid droplets suspended in air, generated by condensation from the gaseous to the liquid state or by breaking up a liquid into a dispersed state, such as splashing, foaming, spraying or atomizing
- **Vapor:** The gaseous form of a substance that is normally in a solid or liquid state

Atmosphere

- **Oxygen deficient:** An atmosphere with an oxygen content below 19.5% by volume
- **Permissible exposure limits (PEL):**
  - The amount of an airborne chemical, toxic substance, or other harmful agent that must not be exceeded during any part of the workday
  - An airborne chemical or toxic substance can have 3 PEL values:
    - TWA8: This is an 8 hour, time weighted average limit
    - Short-term exposure limit (STEL). This is typically a 15 minute, time weighted average limit.
    - Ceiling limit © - This is an instantaneous limit

Engulfment

Engulfment

- Contains a material with the potential for engulfing someone who enters the space
  - Rock / Dirt from Above
  - Structural Failure
  - Drowning

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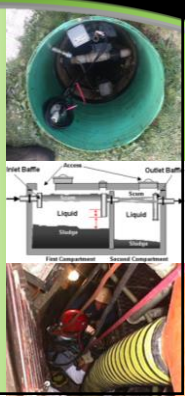
Internal Configurations

- Has a configuration that could allow someone entering to be trapped or asphyxiated by inwardly converging wall or floor, which slopes downward and tapers to a smaller cross-section



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Physical Hazards

- This includes any recognized health or safety hazards including engulfment in solid or liquid material, electrical shock or moving parts

Other Hazards

- Any other safety or health hazard that could impair the ability to self rescue or is an immediate danger to life or health
  - Environmental (heat/cold)
  - Chemicals, Paints
  - Sealants, Adhesives, .22 Power Actuated Hammer
  - Spiders / Snakes / Rats
  - Getting In or Out
  - Impairment of Self Rescue
  - Health (pathogens)

OSS CSE's– What's different for us?

Chapter 296-841 WAC – Airborne Contaminants

Toxic Substance (Any chemical *or* biological agent, such as:)

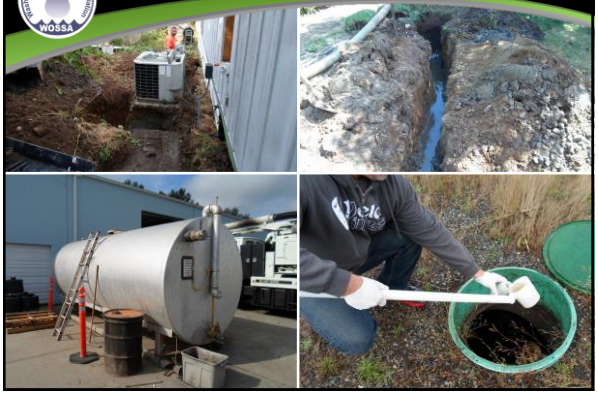
- Bacteria
- Virus'
- and Fungus, which is any of the following:

1.) Listed in the latest edition of the NIOSH Registry of Toxic Effects of Chemical Substances (RTECS)

2.) Shows positive evidence of an acute or chronic health hazard in testing conducted by, or known to the employer

3.) The subject of a safety data sheet kept by or know to the employer showing the material may pose a hazard to human health.

Field Testing done by WOSSA



Sampling Results found in Washington

Laboratory Results Completed by WOSSA

- Mixed Bacterial flora
- Bacillus
- Gram negative Rods
- **Gram positive Cocci**
- Aeronmonas Hydrophila
- Aeromona Caviae
- **Streptococcus**
- Fungus
- Yeasts
- Enteric type gram negative rods
- **Staphylococcus, Coagulase Negative**
- Gram positive Coryneform rods
- Aeromonas Sobria
- **Escherichia Coli O157:H7**
- Fecal Flora
- Spore forming gram positive rods
- Propionibacterium gram positive rods
- **MRSA**
- Diptheroieds
- **Molds and Rare Molds**

Real life On-Site examples from Washington

- Sewage in eyes – Both with “pink eye” needing to go to the Emergency Room
- 2 LNI Claims for “Pink Eye” over $4,000 in paid claims – follow on infections with Sty's
- MRSA infection in nose from Aerosols working in OSS with a one week hospital stay
- Cases of E-Coli & Hepatitis
- Giardia
- Employees’ less than 6 months on the job…sick

WAC 296-809-100

Examples of “Permit Confined Space”

- New Septic Tanks (until they are evaluated)
- “In-Use” or “Contaminated” Septic Tanks
- Pump Truck Tanks
- Tank Excavations (with a cross over to trenches)…

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Tank Configurations

- Not all Tanks are Equal
- Different Tank Construction Materials
- Old Tank vs. New Tank Styles and Design Standards

WAC 296-809-600

Alternative Entry Procedures

- To Choose Alternate Entry Procedures for spaces where the only hazard is hazardous atmosphere
  - Established only after using the permit entry process
  - To qualify, there are ONLY Atmospheric Hazards which can be controlled/eliminated by mechanical ventilation.

WAC 296-809-600

- Make sure, when using alternate entry procedures, instead of permit entry procedures, that you have monitoring and inspection data that supports the following:
  - That the only hazard of the permit-required confined space is an actual or potentially hazardous atmosphere.
  - That continuous forced air ventilation alone is all that is needed to maintain the permit-required confined space for safe entry.

WAC 296-809-600

- Make sure an entry to obtain monitoring and inspection data or to eliminate hazards is performed according to WAC 296-809-500, Permit entry procedures.
- Make sure all documentation produced is available to each affected employee and their authorized representative.

WAC 296-809-600

- Use continuous forced air ventilation as follows:
  - Wait until the forced air ventilation has removed any hazardous atmosphere before entry
  - Direct forced air ventilation toward the immediate areas where entrants are or will be, and continue until they exit the space
  - Provide the air supply from a clean source *and* make sure it does not increase the hazards in the space

WAC 296-809-700

Nonpermit Confined Spaces

- Make sure any space you classify as nonpermit, does not have the potential to contain serious health or safety hazards
  - Follow the following requirements when classifying a confined space as a nonpermit confined space
  - Reevaluate nonpermit confined spaces if hazards develop.

WAC 296-809-700

Nonpermit Confined Spaces

- **Important:** A confined space may be classified as a nonpermit confined space for as long as the hazards remain eliminated. Once a hazard is present, you must follow all requirements of this chapter that apply

WAC 296-809-700

- Follow these requirements when classifying a confined space as a nonpermit confined space
  - The confined space cannot contain an actual or potential hazardous atmosphere
  - The confined space cannot contain hazards capable of causing death or serious physical harm. This includes any recognized health or safety hazards including engulfment in solid or liquid material, electrical shock, or moving parts
  - If you must enter to remove hazards, the space must be treated as a permit-required confined space until hazards have been eliminated

WAC 296-809-700

Note:

- Controlling atmospheric hazards through forced air ventilation does not eliminate the hazards.
- You should evaluate the use of lockout-tagout, as covered in chapter 296-803 WAC, to determine if using it fully eliminates the hazard
- You are allowed to use alternate entry procedures covered in WAC 296-809-600 if you can demonstrate that forced air ventilation alone will control all hazards in the space.

WAC 296-809-700

You must:

- Document how you determined the confined space contained no permit-required confined space hazards. Certify this documentation with the following:
  - Date
  - Location of the space
  - Signature of the person making the determination
- Make the certification available to each entrant, or their authorized representative.

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Confined Space Entry

Roles in a Confined Space Entry
Supervisor, Attendant, Entrant

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Entry Supervisor (WAC 296-809-50018)

- Supervisor Tasks
  - Authorizes the entry into a permit-required confined space by signing the entry Permit
  - Oversees entry operations
  - Knows about the hazards that may be faced during entry, including the mode, signs or symptoms, and consequences of the exposure.

Roles of Confined Space Entry

- Verifies and checks all of the following:
  - The appropriate entries have been made on the permit
  - All tests specified by the permit have been conducted
  - All procedures and equipment specified by the permit are in place
  - before approving the permit and allowing entry to the space

Roles of Confined Space Entry

- Terminates the entry and cancels the permit when:
  - The assigned task or job has been completed
  - A condition in the space that is not covered by the entry permit is discovered
- Verifies that rescue services are available and that there is a way to contact them
- Removes unauthorized individuals who enter or attempt to enter the permit-required confined space during entry operations

Roles of Confined Space Entry

- Determines that entry operations remain consistent with the terms of the entry permit and acceptable entry conditions are maintained:
  - Whenever responsibility for a permit-required space entry operation is transferred; and
  - At regular intervals dictated by the hazards and operations performed within the space.

Roles of Confined Space Entry

- **SET UP:** Is to have a Safety Tail Gate and/or a JSA (Job Safety Analyst) and fill out the paper work and have all technicians sign the JSA/Safety Tail Gate as well. You need to go over all the hazardous and emergency plan with the crew before the job starts. To inspect all the equipment to make sure it has been set up properly and that paper work is filled out. That the site is secured.
- **DURING:** To maintain control over the job and assist in the safety and productivity of the crew and equipment.
- **AFTER:** Cancel and sign the permit, make sure entrant has disposed of or clean any contaminated clothing, PPE, safety equipment. Supervisor is to clean and maintain vehicle equipment. To ensure all appropriate paper work reaches dispatch and the safety coordinator. Job site has been cleaned and put back in working order. All equipment is accounted for and brought back in working condition.

Roles of Confined Space Entry

Attendant (WAC 296-809-50020)

- Attendant Tasks: Provide at least one attendant outside the permit-required confined space during entry operations
  - Understands the hazards that may be faced during entry, including the mode, signs or symptoms, and results of exposure to the hazards
  - Is aware of the behavioral effects of exposure to the hazard

Roles of Confined Space Entry

- Continuously maintains an accurate count of entrants in the space
- Maintains an accurate record of who is in the permit-required confined space
- Communicates with entrants as necessary to monitor their status or alert them of the need to evacuate the space
- Monitors activities inside and outside the space to determine if it is safe for entrants to remain in the space

Roles of Confined Space Entry

- Orders entrants to evacuate the space immediately if any of the following conditions occur:
  - A prohibited condition.
  - The behavioral effects of hazardous exposure in an entrant.
  - A situation outside the space that could endanger entrants.
  - The attendant cannot effectively and safely perform all the duties required in this chapter.

Roles of Confined Space Entry

- Takes the following actions when unauthorized persons approach or enter a space:
  - Warn unauthorized persons to stay away from the space
  - Tells the unauthorized persons to exit immediately if they have entered the space
  - Informs entrants and the entry supervisor if unauthorized persons have entered the space
- Performs non-entry rescues as specified by your rescue procedure

Roles of Confined Space Entry

- Has the means to respond to an emergency affecting one or more of the permit spaces being monitored without preventing performance of the attendant's duties to the other spaces being monitored
- Carries out no duties that might interfere with their primary duty to monitor and protect the entrants
- Calls for rescue and other emergency services as soon as entrants may need assistance
- Monitors entry operations until relieved by another attendant or all entrants are out of the space

Roles of Confined Space Entry

- **SET UP:** Is responsible for monitoring the entrants, keeps unauthorized entrants away from the space, has consent communication with the entrants, monitors their status, tells them when to evacuate, remains outside the space during entry operations until relieved by another certified attendant or until all entrants have exited the confined space. Use all equipment properly, determines that acceptable entry conditions are maintained, know the hazards, including the mode, symptoms and consequences of exposure and performs non-entry or entry rescue.
- **DURING:** Is to be monitoring and keeping in communication with the entrant at all times. **You are to record the gasses every 15 minutes and communicating with entrant at least every 15 minutes.** It is your responsibility to insure the safety of the entrant at all times.
- **AFTER:** Is responsible for making sure all safety equipment is cleaned, stored and check back in properly. That the job site has been cleaned and put back in working order or has been cautioned off and made safe until the next working day. **All equipment is accounted for and brought back.**

Roles of Confined Space Entry

Entrants (WAC 296-809-50022)

- Entrant Tasks:
  - Know the hazards they may face during entry, including the mode, signs or symptoms, and results of exposure to the hazards
  - Use equipment properly
  - Communicate with the attendant as necessary so the attendant can monitor entrant status and alert entrants of the need to evacuate

Roles of Confined Space Entry

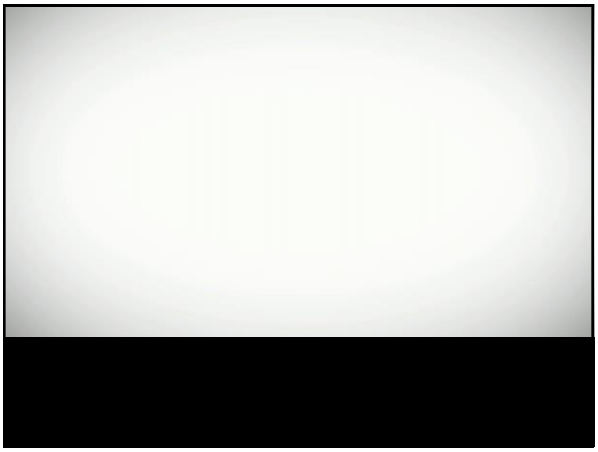
- Alert the attendant whenever either of these situations exist:
  - A warning sign or symptom of exposure to a dangerous situation such as, behavioral changes, euphoria, giddiness potentially from lack of oxygen or exposure to solvents
  - A prohibited condition

Roles of Confined Space Entry

- Exit from the permit-required confined space as quickly as possible when one of the following occurs:
  - The attendant or entry supervisor gives an order to evacuate
  - The entrant recognizes any warning sign or symptom of exposure to a dangerous situation
  - The entrant detects a prohibited condition
  - An evacuation alarm is activated

Roles of Confined Space Entry

- **SET UP:** Is to communicate with the attendant, use all equipment properly, inspect the equipment before using it, exit from the permit space immediately upon an order to evacuate, an alarm warning or signs of a hazardous condition. Entrant must know the hazards, symptoms and consequence of exposure. Notify the attendant of any signs or symptoms of exposure to a hazardous condition.
- **DURNING:** Is to be doing their work in a professional, productive and safe manner at all times, it is your responsibility to know the signs of exposures in a confined space and to be communicating with the attendant and supervisor at all times.
- **AFTER:** Are responsible for making sure all safety equipment is cleaned, inspected, stored and checked back in properly. That the job site has been cleaned and put back in working order or has been cautioned off and made safe until the next working day. That all equipment has been accounted for and brought back.



Excavations and Trenches

- Soil logs
- Tank Excavations
- Trenches

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Where Do We Go from Here?

General Management Principles of
CSE Safety in the OSS Industry

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Where are we at now as an industry?

We found three levels of program

- Companies with no program or awareness of CSE requirements
- Companies with an understanding of the requirements but are non-compliant
- Companies with an understanding of the requirements but have gaps in their CSE Program

What are other factors?

The "Resistance" Barrier….

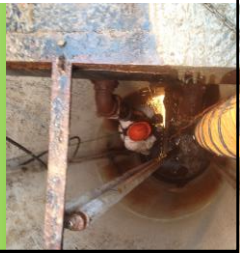
What reasons do you think the use of Confined Space Programs are so low in our industry?

- Resources
- Knowledge
- Time

Behavioral Elements

Everyone is different, But

- Behaviors are learned
  - Perception of risk
  - Acceptance of risk
  - Past Experience
  - Current need



Program and Best Practice

How Do I Know if I need a CSE Program?

- The rule applies to your company if <u>any</u> of the following exist
  - There are confined spaces in the workplace
  - Your employees will enter another employer's Confined Spaces
  - A contractor will enter your CSE's
  - You provide confined space rescue services

Page 3

- **Summary Requirement:**
  - Identifying and control of permit-required confined spaces
- **Your responsibility:**
  - To identify your permit-required confined spaces and control employee entry
- **You must:**
  - Identify permit-required confined spaces

- **WAC 296-809-20002 : Identifying and Controlling Permit Required Confined Spaces**
  - Identify permit-required spaces
  - Posting signs?

Minimum labeling

Better??

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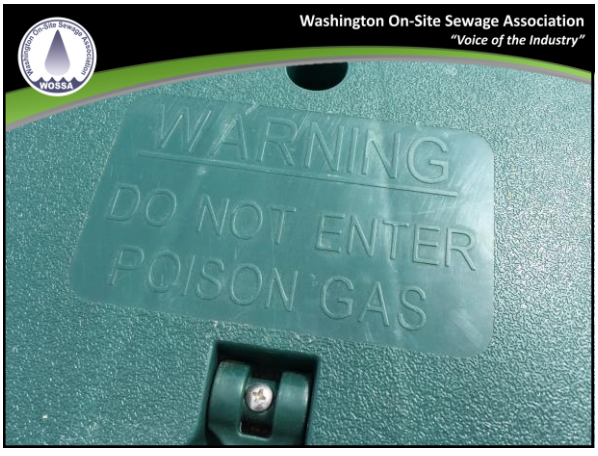

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WAC 296-809-200 Summary

Page 4-5

- **Your Responsibility (cont.):**
  - Inform employees and control entry to permit-required confined spaces.
    - *WAC 296-809-20004*
  - Follow these requirements when you contract with another employer to enter your confined space.
    - *WAC 296-809-20006*

WAC 296-809-300 Summary

Page 6

- **WAC 296-809-300 Summary**
- Your responsibility:
  - To develop your permit-required confined space program and practices
- **IMPORTANT:**
  - This section applies if employees will enter a permit-required confined space

WAC 296-809-300 Summary

Page 6

- **You must:** WAC 296-809-30002
  - Develop a written permit-required confined space program before employees enter, that describes the means, procedures and practices you use for the safe entry of permit-required confined spaces as required by this chapter. Including the following:
    - Documentation of permit entry procedures
    - Documentation used for alternate entry procedures
    - How to reclassify permit –required to non-permit Confined Spaces
    - Designation of employee roles: entrant, attendant, entry supervisors, rescuer, and those that test or monitor the atmosphere
    - Identification of designated employee duties
    - Training employees on their designated roles

WAC 296-809-300 Summary

Page 7

- **You must:** WAC 296-809-30002 – Cont.
  - Provide training to employees
    - On how to identify and evaluate hazards
    - Use and maintenance of the equipment
    - How to prevent unauthorized entry
    - How to coordinate with another employer
    - How to rescue entrants
  - Note: For alternate entry, your written program only needs to meet requirements of WAC 296-809-400, employee training and WAC 296-809-600: alternate entry procedures

WAC 296-809-300 Summary

Page 7

- **You must:** WAC 296-809-30004 – another employers space
  - Obtain any available information about permit-required confined space
  - Coordinate entry operations with any other employers whose employees will be working in or near the confined space
  - Inform the host employer, either through a de-briefing or during operations about:
    - The entry program that you will follow: and
    - Any hazards you confronted or created in the space during entry operations

WAC 296-809-400

Page 8-9

- Summary:
  - Your Responsibility
    - To make sure employees are trained to perform their designated roles safely.
  - You Must
    - Provide employee training per WAC 296-809-40002
    - Certify employee proficiency per WAC 296-809-40004

WAC 296-809-40002

Page 8-9

- Provide Employee Training:
  - You Must
    - Provide training to each employee involved in permit required confined space activities so that they acquire the necessary understanding, knowledge and skills to safely perform assigned duties.
  - Note: Employers can determine proficiency by:
    - Observing employee performance during simulated exercises
    - A comprehensive written examination; or
    - Any other method that is effective for the employer

WAC 296-809-40002

Page 8-9

- Provide Employee Training:
  - You must provide training at the following times:
    - Before an employee is first assigned to duties under the chapter
    - Before there is a change in assigned duties
    - When there is a new confined space hazard for which the employee has not already been trained
    - If you have reason to believe there are either deviations from your procedures or employee knowledge *or* use of your procedures are inadequate.

WAC 296-809-40002

Page 8-9

- Provide Employee Training:
  - You Must:
    - Certify employee proficiency in their assigned duties
    - Make sure the certification contains:
    - Each employee's name, the trainer's written or electronic signature or initials and the date of the training and is available for inspection by employee's and their authorized representatives

WAC 296-809-500

Page 10-21

- Summary:
  - Your responsibility
    - Establish procedures for permit required CSE
    - Implement those procedures
    - Use and entry permit that contains all required information
    - Keep and review your entry permits
    - Prevent unauthorized entry
    - Provide, maintain and use proper equipment
  - WAC 296-809-50002,50004, 50006,50008,500010,

WAC 296-809-500

Page 10-21

- Summary:
  - Your responsibility
    - Evaluate and control hazards for safe entry
    - Assure availability of rescue and emergency services
    - Use non-entry rescue systems whenever possible
    - Ensure entry supervisors perform duties and responsibilities
    - Provide an attendant outside the permitted confined space
    - Ensure entrants know the hazardous conditions and their duties
    - Have and implement procedures for ending entry

Example Procedure For Permit

When a confined space work activity is identified, it is a requirement to use and complete a CSE permit to evaluate the space.

You must test the atmosphere before entering .

You must monitor the atmosphere the entire time the entrant is in the space.

You will note this in the area of the permit where it says Atmospheric Monitoring.

If the entrant leaves the space and then enters at a later time you will need to test the atmosphere before the entrant enters the confined space and do constant monitoring awhile entrant is in the confined space.

All areas of the permit will be completed and supervisor signs off on the time permit canceled.

Example Procedure For Permit

The permit will be used if self entry, non-entry or entry rescue is performed. All information will be completed. The permit will be signed of at the completion of the job when the CSE has ended.

If you have not identified and evaluated a third party rescue service, you must use non-entry rescue equipment on permitted CSE's. Indicate where the Permit forms are located and available.

Equipment Review

Equipment (Inspect all equipment before and after entry):

- Tripod
- Winch
- Harness
- Blower
- Gas monitor
- Lock Out/Tag Out Equipment
- Communication Methods
- Permit Paperwork



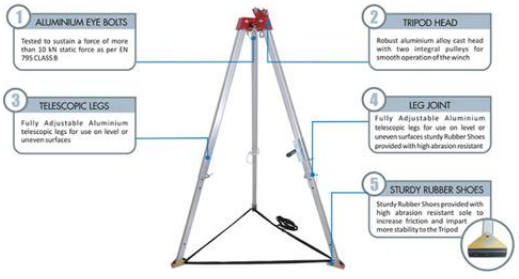

Equipment Review

Equipment Review

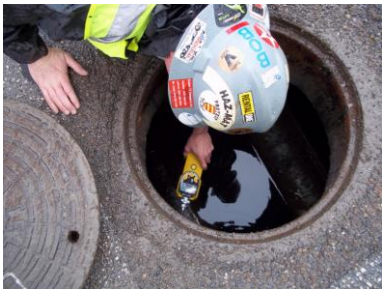
Equipment Review

Equipment Review

Equipment Review



Equipment Review



Equipment Review

Equipment Review

Equipment Review







PPE (Personal Protective Equipment):

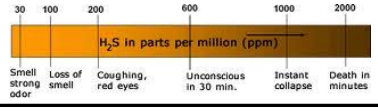
- Hard Hat
- Gloves
- Safety Glasses
- Respirators (Must be certified) / filters
- Face Shields (When possibility of flying fragments, objects, large chips and particles.
- Steel Toed Boots
- Tyvek Suites
- Ear Protection
- Lighting

Readings on Sniffer

- **Oxygen**: (Chemical Form O2) Needs to read between19.5% and 23.5%: Too much oxygen: things burn very, very easily in oxygen enriched atmospheres, so that's a bad thing; too little can cause a Carbon Monoxide.
- Physical signs of not enough oxygen would be uncoordinated, judgment becomes impaired, and people become unconscious and or die.
- READING SHOULD BE = 20.0

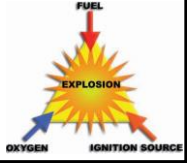
Readings on Sniffer

- **Hydrogen Sulfide** (Chemical Form H2S): Colorless, smells like rotten eggs; heavier than air; very poisonous, corrosive & explosive. (Physical signs of hydrogen sulfide poising is irritates the eyes, nose, throat and respiratory system; burning tearing of eyes, cough or shortness of breath, headache, dizziness, nausea, vomiting, excitability and or staggering. READING SHOULD BE = 0
- **IDLH:** immediately dangerous to life and health (level that interferes with the ability to escape) (NIOSH)
- **PEL:** permissible exposure limit (enforceable) (OSHA)



Readings on Sniffer

Methane (Chemical Form CH4) – Colorless, odorless flammable gas that is the main constituent of natural gas. Methane is found in the ground; it displaces oxygen and is a combustible gas. (Physical signs of inhaling methane: headaches, tiredness or fatigue, dizziness, nausea and may become confused, irritable, difficulties with physical coordination or death.) READING SHOULD BE =0



Readings on Sniffer

Carbon Monoxide (Chemical Form CO) - Colorless, tasteless, odorless; lighter than air; takes the oxygen out of the air. Carbon monoxide is in car exhaust fumes, cigarette smoke, fires, electrical generators, propane fueled equipment. (Physical signs of carbon monoxide poising is headache, dizziness, nausea, convulsions, death.) READING SHOULD BE = 0

Hazard Control

Ventilation –

Natural: Depending on the configuration of the confined space, natural ventilation, together with eliminating and introduction of new contaminated, may be enough to control or mitigate atmospheric hazards.

Mechanical: Pushing fresh air into a space under positive pressure, or exhaust ventilation where you are removing the contaminated air. Use with new tanks

Exhaust Ventilation or Negative Pressure: Pulls contaminated air out of the space. Take care not to contaminate the area outside the space with materials pulled from inside of the space. Exhaust ventilation is considered to be the better way to ventilate flammable or toxic atmospheres. Use with contaminated tanks in use.

Air Turnover/Ventilation

CFM (pump size)	Gallons (tank size)
20-40	80-200
50-90	150-500
100-120	400-800
130-150	700-1,200
160-200	1,000-1,800
210-240	1,700-2,500
250-280	2,400-3,000
290-340	3,100-3,600
350-400	3,500-4,200

Hazard Control

Common find in a Pump Tank

Hazard Control

Lock Out / Tag Out

Six Steps:

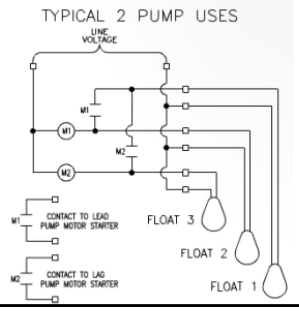
Preparation for shutdown – Know the types and magnitude of energy involved, the hazards of the energy and the methods of controlling the energy.

Shutdown- This may be as simple as throwing a switch or it may require a more orderly, methodical shutdown sequence,.

Isolation – Locate ALL energy isolation points that control the particular equipment involved.

Hazard Control

LO/TO – you need to be able to read these



Hazard Control

Lock Out / Tag Out

Six Steps:

Application of lock out/ tag out devices: lock out / tag out devices shall be installed by and authorized employee to hold the energy isolation points in a safe position.

Control stored energy – Assure all potentially hazardous stored energy is controlled and /or alleviated.

Verification of isolation – An authorized employee shall verify, prior to entering the space or performing work on equipment, that it has been locked and/or tagged.

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Working in the Field

Case Study #1

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Confined Space Entry – Case Studies


Confined Space Entry – Case Studies


Confined Space Entry – Case Studies


Confined Space Entry – Case Studies

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Case Study #2

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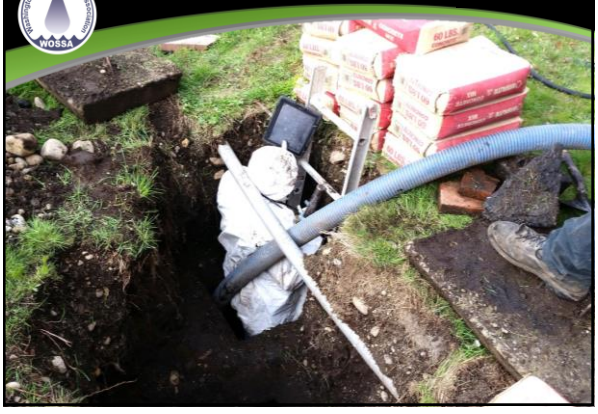
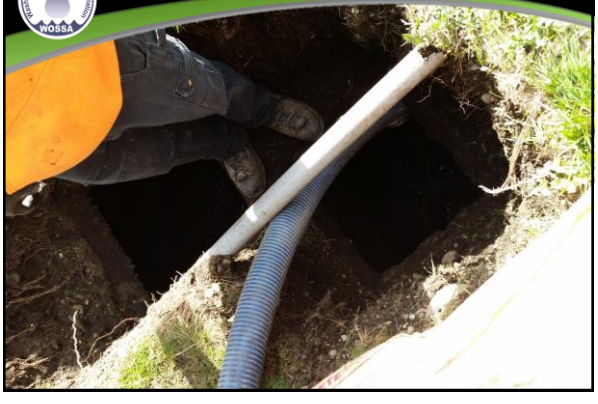


Confined Space Entry – Case Studies



Confined Space Entry – Case Studies

Confined Space Entry – Case Studies

Confined Space Entry – Case Studies

Section V - Health Hazard Data

Acute Effects: Wet cement on unprotected skin, whether direct or through saturated clothing, can cause severe, third degree caustic burns. **NOTE: Portland cement burns skin with little warning; discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. The severity of the burn may not be detected until several hours after the damage begins.** Dry portland cement can produce mild irritation to severe burns of the eye; it can irritate the upper respiratory system.

Confined Space Entry – Case Studies

Chronic Effects: Dry Portland cement can cause inflammation of the lining of the nose and the cornea. Repeated exposure to Portland cement may result in drying of the skin and may lead to thickening, cracking, or fissuring of the skin. Hypersensitive individuals may develop an allergic dermatitis (possibly due to trace amounts of hexavalent chromium at less than 0.005%). This reaction may appear in several forms including a mild rash to severe skin ulcers. Persons already sensitized may react to their first contact with the product. Other persons may experience this effect after years of exposure to Portland cement products.

Confined Space Entry – Case Studies

Signs and Symptoms of Exposure: Burning sensation around moist tissue areas (i.e., eyes, nose, upper respiratory system); painful burning on exposed skin that can develop with little warning. **Exposure of sufficient duration to wet Portland cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns, including third degree burns.** The same kind of destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry Portland cement. **DO NOT ALLOW WET PORTLAND CEMENT TO GET INSIDE BOOTS, SHOES, OR GLOVES AND DO NOT ALLOW WET, SATURATED CLOTHING TO REMAIN AGAINST THE SKIN.**

Confined Space Entry – Case Studies

Confined Space Entry – Case Studies

CSE Program:

No CSE Paperwork at Entry

No Pre-Entry Air Quality Testing / Yes - Active Air Monitoring

Air Vacuum w/ Truck Hose

No Mechanical Rescue Equipment

Second Person On-Site

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Case Study #3

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Confined Space Entry – Case Studies

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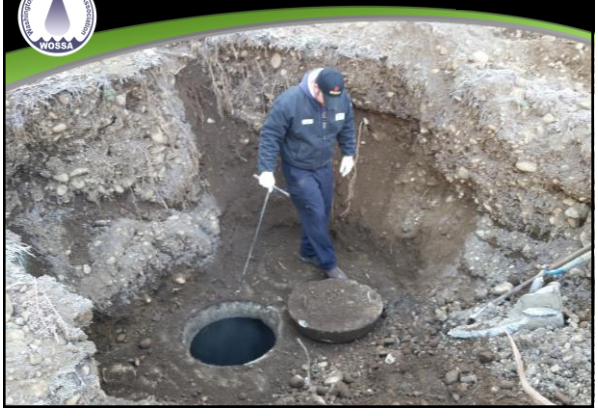

Confined Space Entry – Case Studies

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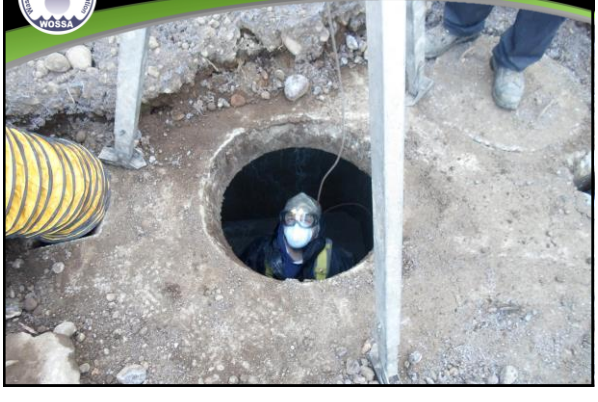
Best Practice - Personal Behaviors

Confined Space Entry – Case Studies

Confined Space Entry – Case Studies

Confined Space Entry – Case Studies

Best Practice - Personal Behaviors




Confined Space Entry – Case Studies


Confined Space Entry – Case Studies


Confined Space Entry – Case Studies

Confined Space Entry – Case Studies

CSE Program:

No CSE Paperwork

No Active Air Monitoring

No Forced Air Ventilation / Used Vacuum Air with Ventilator

Used Mechanical Rescue Equipment

Used Second Person

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Case Study #4

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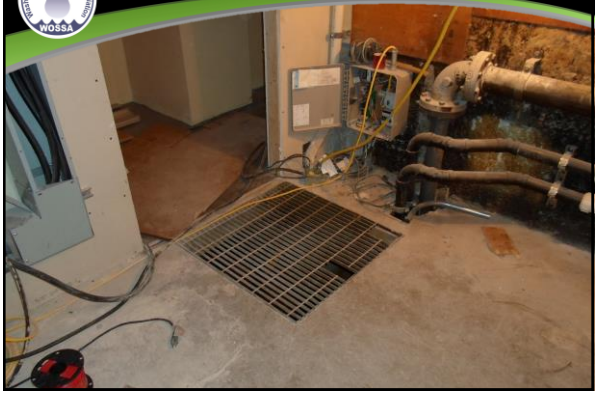

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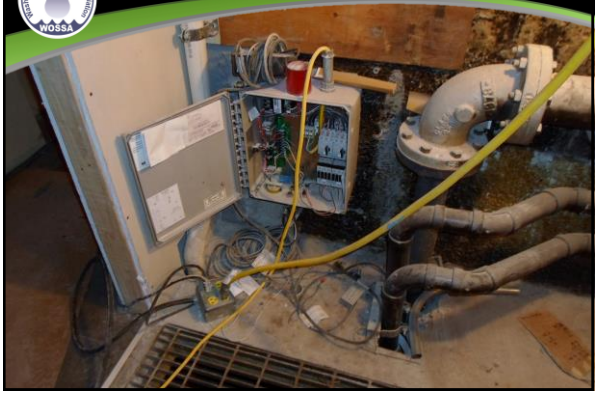

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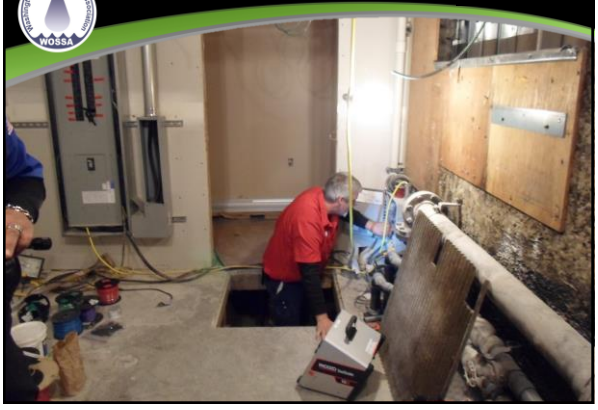

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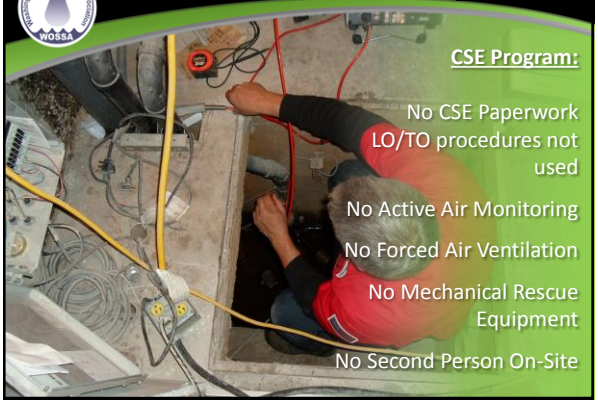

CSE Program:

No CSE Paperwork
LO/TO procedures not used

No Active Air Monitoring

No Forced Air Ventilation

No Mechanical Rescue Equipment

No Second Person On-Site

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Questions?

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CSE Practical Field Activities

Setting up and operating the Tri-Pod
Using an Air Monitoring Meter
Harness up and entry
Non-entry Rescue

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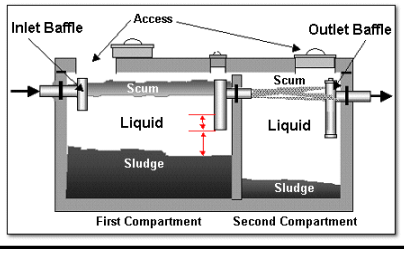
Consideration to venting as well as potential for cross over from second compartment to first compartment if not plugged at the crossover or some other means. EACH tank is going to be different



Consideration to venting as well as potential the need to isolate electrical energy will be critical. EACH tank is going to be different