

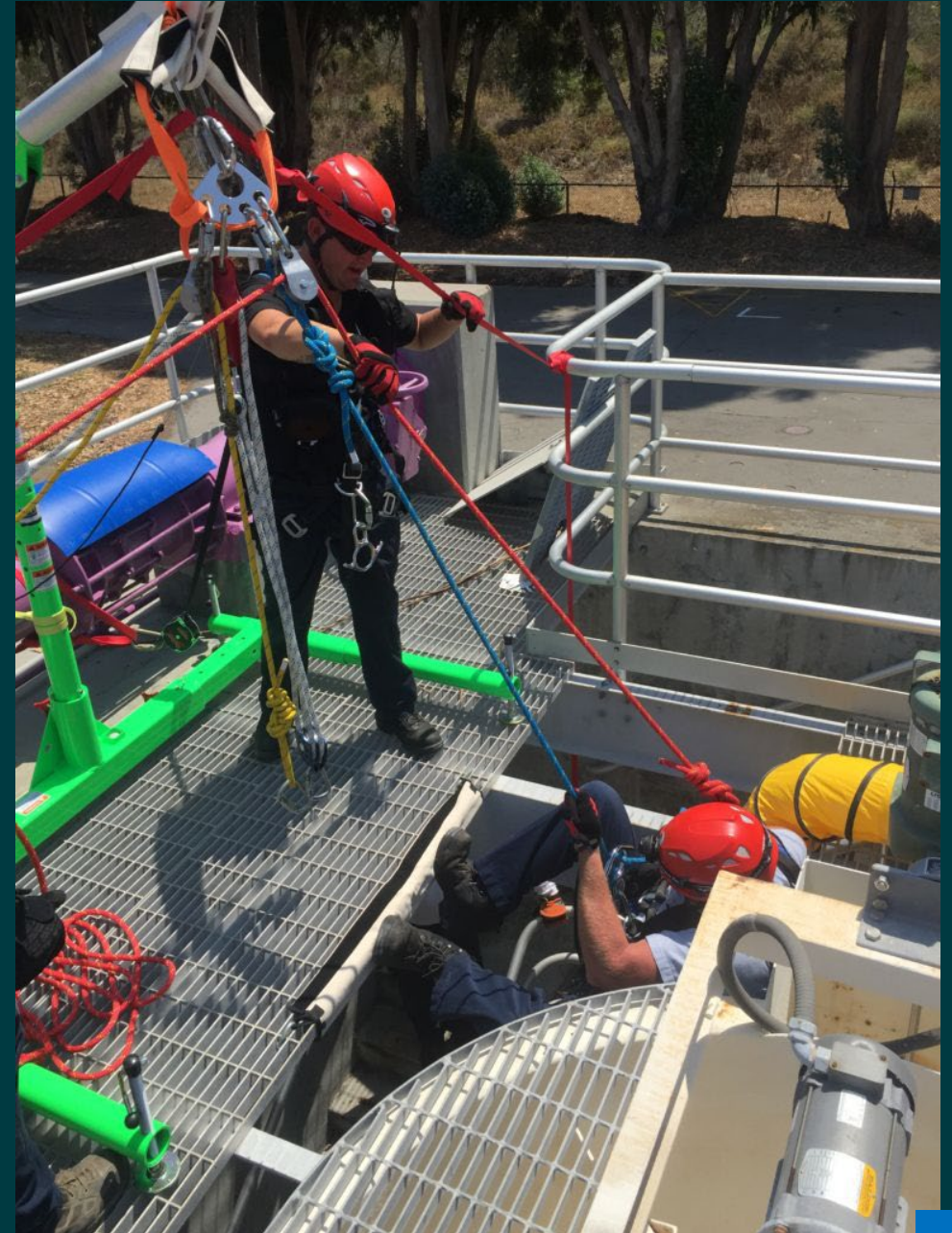
**Oregon OSHA Rule &
City of Eugene
Wastewater Division
Procedures**

**CONFINED
SPACES
TRAINING**

The Oregon OSHA Confined Space Rule is applicable to General Industry and Construction, OAR 437-002-0146: The purpose of this rule is to provide requirements to **protect employees from the hazards of entering and working in confined spaces.**

But what is our real goal? To save lives. Fatalities related to unsafe confined space entry are not rare. It is because of this grim reality that Oregon OSHA has developed the Confined Space Rule.

At the Wastewater Division, Confined Space Entry is one of our more dangerous activities and this training is to be taken seriously. No one is to enter confined spaces without completing this training, on the job training, and displaying competence with supervisor's evaluation.



PURPOSE

The Wastewater Division is committed to ensuring that City employees safely occupy confined spaces in the performance of their job duties. The purpose of the Confined Space Program is to clearly define confined space entry procedures and employee training requirements for confined space entry in accordance with OAR 437-002-0146. Additional division-specific procedures also apply.

***Reference the written Confined Space Program WW-257 in Shared Docs.**

OR-OSHA

Oregon OSHA requires a comprehensive training program that goes over all aspects of Confined Space Entry, even if our practice does not include all aspects of the program. To avoid confusion, this training is broken into two main sections:

1. Complete overview of Confined Space Entry per OSHA's Rule.
2. What we do at the City of Eugene Wastewater Division

Training Content

OR-OSHA Rule

- Definitions
- What is a Confined Space?
- What is a Permit-Required Confined Space?
- Roles & Responsibilities for Entrants, Attendants and Entry Supervisors
- Hazard Evaluation & Risks
- Elimination and Control of Hazards
- Signage
- Permit Entry Procedures
- Alternate Entry
- Canceling Entry
- Prevention of Unauthorized Entry
- Rescue

Wastewater Division Procedures

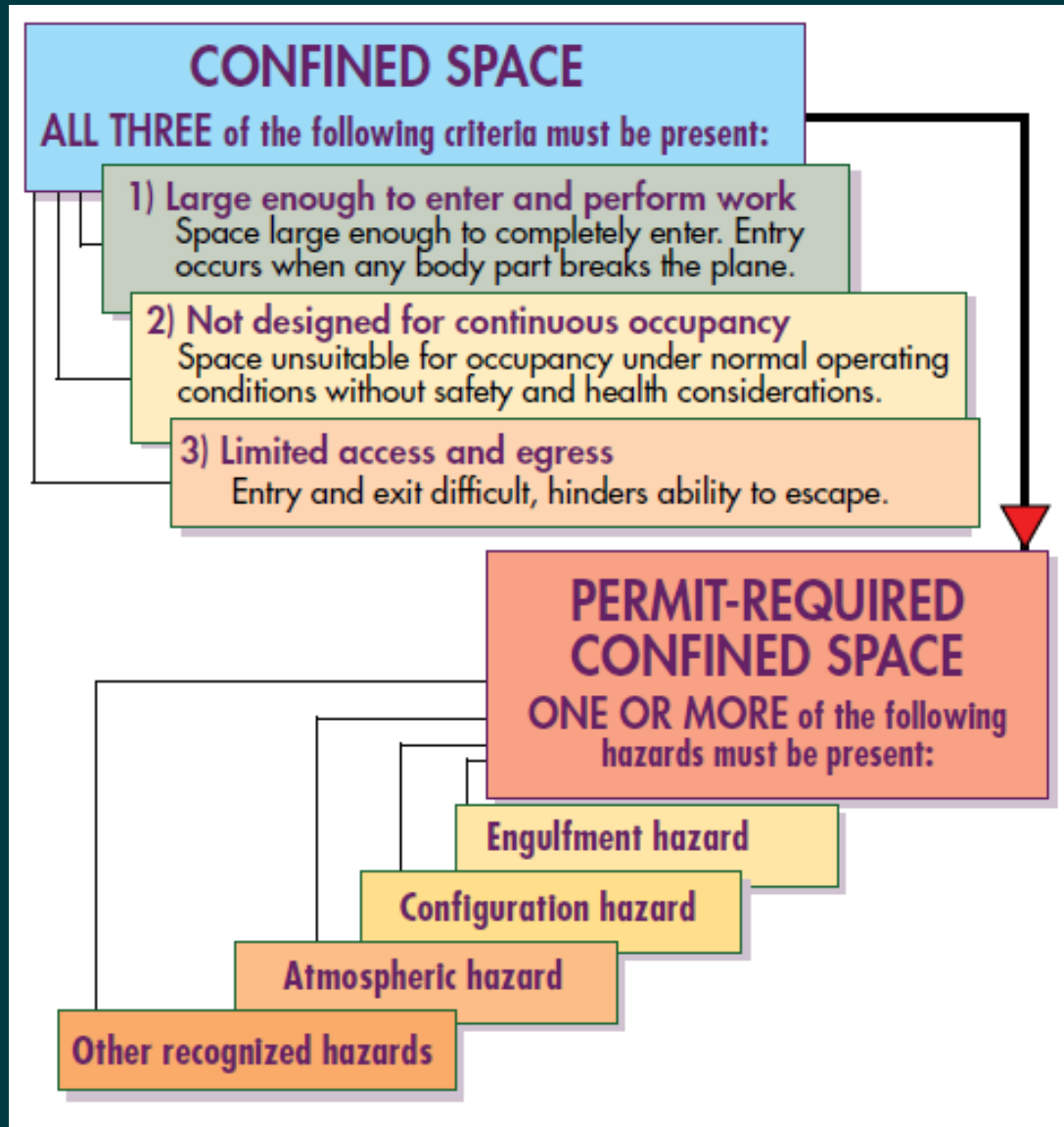
- Permit Required Spaces at Wastewater
- Hazard Assessment and Entry Plans
- Alternate Entry
- Breaking the Plane Only
- Safety Equipment
- Air Monitoring & Gas Meters
- Hot Work in Confined Spaces
- Rescue
- Contractors Involved in Confined Space Entry
- Records
- Training Requirements

DEFINITIONS

Sample of Definitions – Reference Confined Space Program WW257 for all definitions

- **Authorized entrant:** An employee who is authorized by the employer to enter a permit space.
- **Alternate Entry:** An alternative process for entering a permit required space under very specific conditions. The space remains a permit required space even when entered using alternate entry and even though no entry permit is required by OSHA in those circumstances.
- **Calibration:** The checking of a direct-reading instrument against an accurate standard (such as a calibration gas) to determine any deviation and correct for errors. **Note:** A similar process may also be referred to as a “bump test” in which an instrument is tested with an accurate standard to ensure it is still reading correctly. For the purposes of this rule, a “bump test” performed in accordance with the manufacturer’s instructions can be used to verify calibration.
- **Confined Space is a space that meets all of the following:** Is large enough and so configured that an employee can bodily enter the space and perform work. Has limited or restricted means for entry and/or exit (for example tanks, vessels, silos, storage bins, hoppers, vaults, pits, manholes). Is not designed for continuous employee occupancy.

Confined Spaces versus Permit-Required Confined Spaces



- To be considered a confined space, it must be large enough for full body entry.
- Confined spaces can be inside, outside, on top of and underneath a building, and can be a piece of machinery, including mobile units.
- Permit Required Confined Spaces are identified with signs.

Confined Space Examples

	Yes	No	?
Crawlway under a building	✗		
Finished Attic		✗	
Crane control cab		✗	
Dumpster	✗		✗
55-gallon drum		✗	
Vactor truck collection tank	✗		
Culvert under a highway	✗		✗
Trench	✗		✗



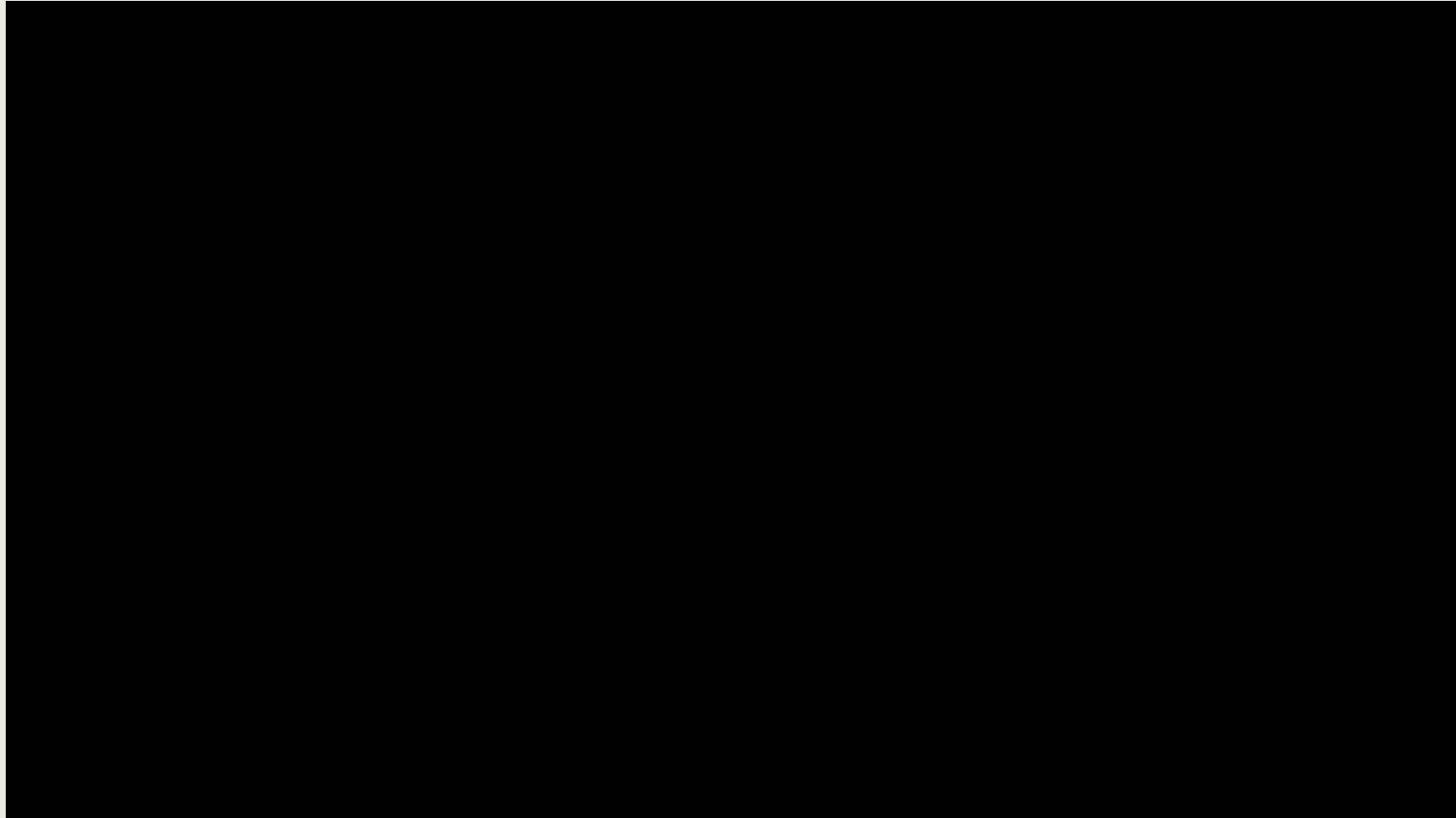
“Permit-Required”

Permit-Required means in order to enter the confined space, a specific process must be followed that includes filling out a permit form and having it approved prior to entry.

A Permit-Required Confined Space will always be called “Permit-Required” no matter what method of entry is used. This can be confusing when we start talking about alternative entry options later on in the training because a “permit” is no longer required in those circumstances. Even in those instances, the spaces are still referred to as Permit-Required Confined Spaces.

It is incredibly important to understand that a Permit-Required Confined Space is one that meets the OR-OSHA definition of a Confined Space and has the potential for hazards to be present before any hazard mitigation takes place. When hazards are eliminated or controlled temporarily for entry, we still call it a Permit-Required Confined Space.

Confined Space Fatalities (double click to play video)

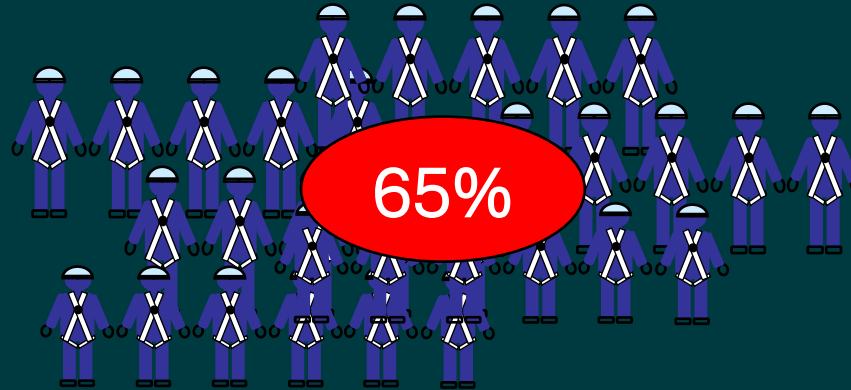


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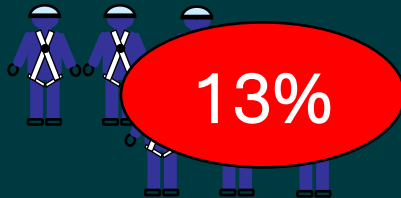
WORKERS ARE KILLED BY:

Atmosphere

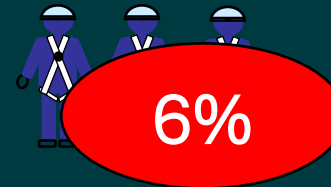
Oxygen Deficient, Toxic, or Explosive



Engulfment



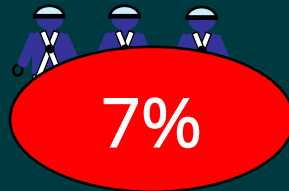
**Heat
Cold**



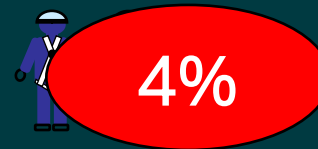
Electrocution



**Falling
Objects**

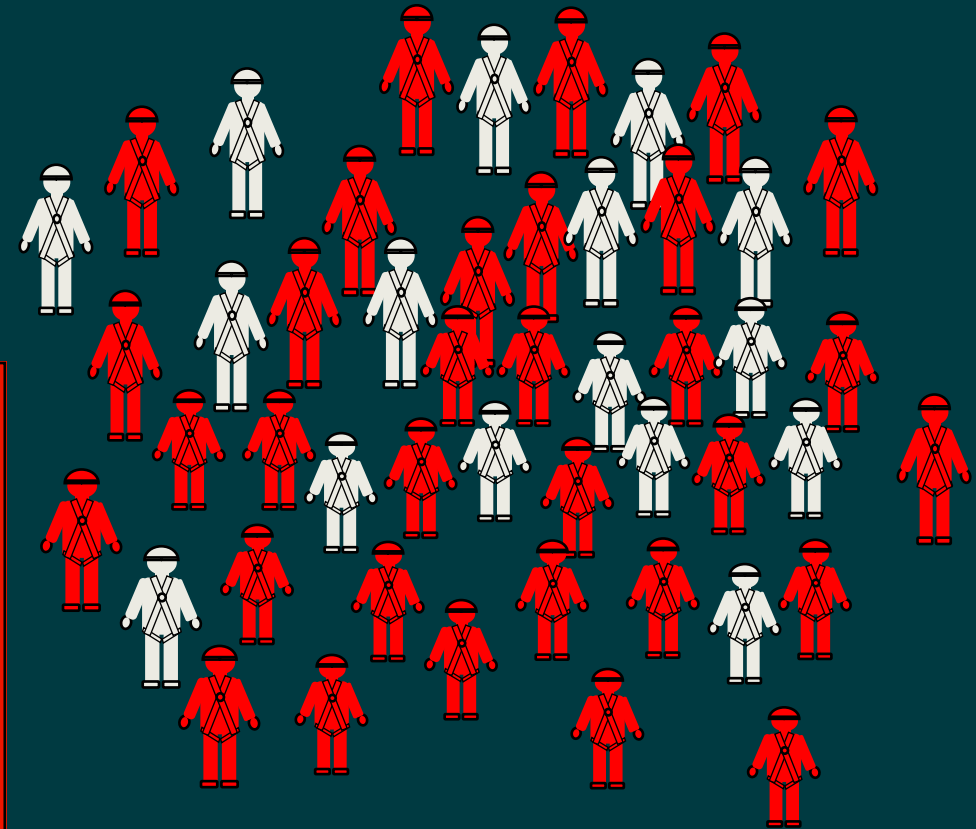


Falls



What do they all have in common?

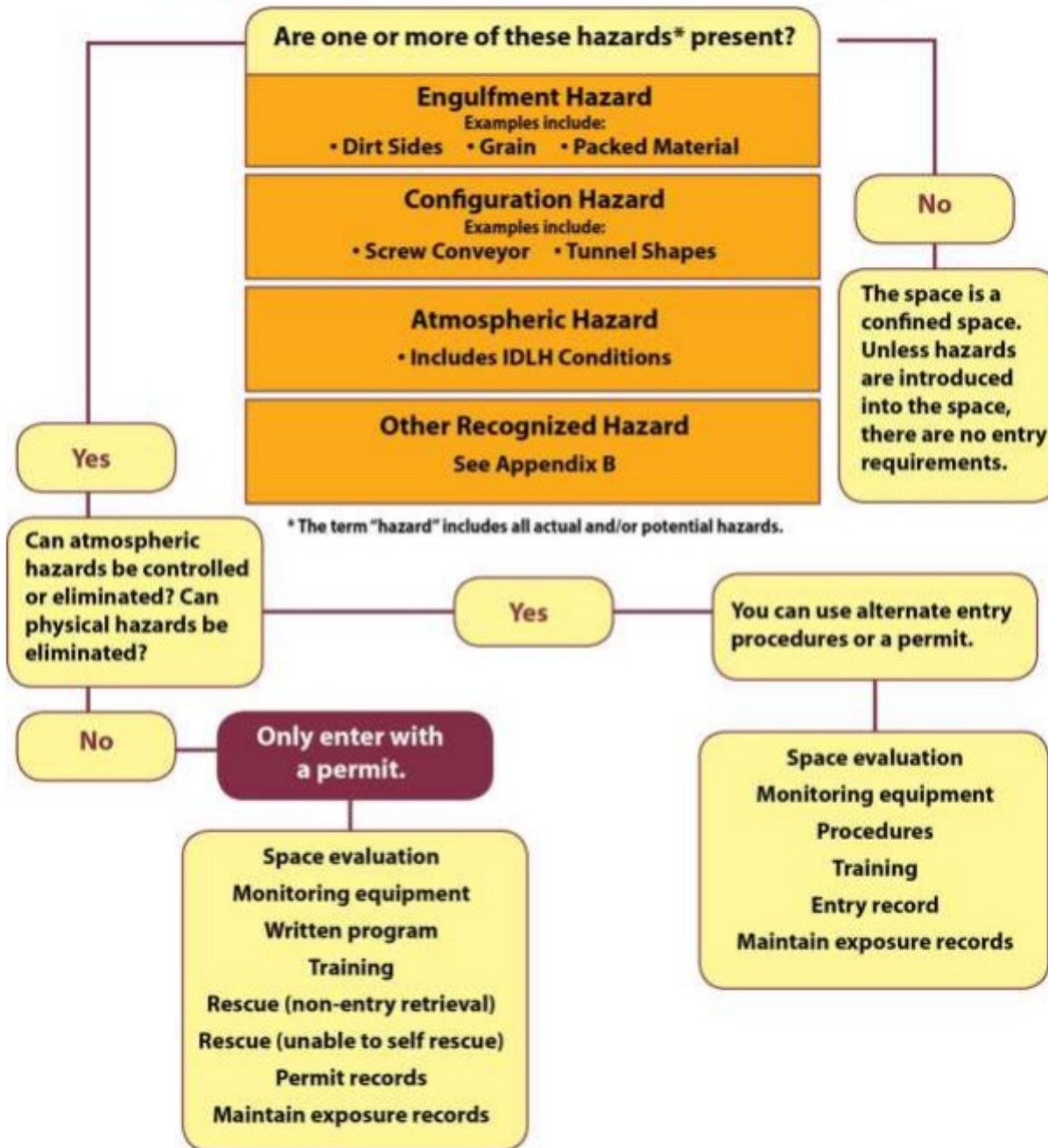
Two thirds of victims were untrained rescuers.



Untrained rescuers react with adrenaline, which reduces higher order thinking. These reactions are impulsive and do not consider possible hazards.



You determined that you have a confined space.



After you determine you have a confined space, you then determine if any **serious safety hazards** might exist in the space.

A serious safety hazard prevents **self rescue**.

Next, you determine if you can eliminate or control all hazards.

Confined spaces can be inside, outside, on top of and underneath a building, and can be a piece of machinery, including mobile units.

Permit Required Confined Spaces are identified with signs.

EVALUATE AND IDENTIFY SPACES

- Determine if a space is confined space, if it meets the definition, then...
- Evaluate whether it contains a hazard. If a hazard exists then it becomes a permit-required confined space, which triggers entry procedures.
- Wastewater has evaluated our spaces and identified permit-required confined spaces. But new spaces can be created by unique circumstances.
- If you think a space needs to be re-evaluated, please let the Safety Manager know. The space will be re-evaluated upon your request.
- Any space will be re-evaluated if known conditions change.

What is entry?

Entry into a Permit Required Confined Space occurs when **any part of an entrant's body** breaks the plane of the confined space – this can include just your **hand** reaching past the opening or your face looking into a space.



How do we ensure your safety?

- Identify/Assess Permit Spaces
- Develop Policies and Procedures
- Provide Equipment
- Use an Entry Permit (or Alternate Entry Form when conditions are met)
- Train Entrants, Attendants, and Entry Supervisors



Permit Required Confined Space (PCRS) Team

Attendant Monitors/protects entrants from outside hazards.

Entrant Enters the space. Watches out for hazards.

Entry Supervisor Makes sure the space is safe to enter.

Safety Manager Maintains records, written program, expired permits.

Rescue Team Enters the space to perform rescues



Responsibilities: Attendants

Attendants (safety) must:

- Know the hazards entrants may face during entry and the **symptoms of exposure**
- Be able to use all safety equipment. And ensure entrants are using all **PPE** identified on the permit.
- Remain **at the entrance** until relieved by another attendant or entry is complete.
- Communicate with entrants to monitor their status and issue an order to evacuate if **any hazard arises**.
- Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space. This may include hazards that **weren't included on the permit**.
- Ensure that the only people inside the space are the entrants identified on the permit.
- Contact rescuers (if needed).
- Never **enter*** the space

*Break the plane of the space opening



Responsibilities: Attendants (cont.)

Attendants must:

- Order entrants to evacuate immediately under the following conditions:
 - when a **dangerous or hazardous** condition is detected
 - if the **behavioral effects** of hazard exposure are detected.
 - if there is a dangerous situation **outside** the space.
 - if the attendant cannot perform **all** required duties.
- After directing entrants to evacuate, summon emergency services, if necessary.
- Warn unauthorized persons to stay away if they approach the space; tell them to leave immediately if they enter the space; and inform the entrants and entry supervisor if unauthorized persons have entered the space. Call 9-1-1 for police assistance if unauthorized persons refuse to leave the space.
- Perform **non-entry rescues** following WW established rescue procedure.
- Do nothing that would interfere with monitoring and protecting an entrant.
- Be able to perform all their duties **equally** if attending more than one space (avoid if possible).

Roles and training requirements for Entrants

Entrants must:

- Know about hazards that they may face during entry and the signs, symptoms and consequences of exposure
- Communicate with the attendant so the attendant can **monitor** their status and warn them when they need to evacuate
- Alert the attendants about hazardous conditions in the space or **symptoms** of exposure
- Exit the space immediately when:
 - An order to evacuate is given by the attendant or the entry supervisor
 - An **entrant** recognizes any warning sign or symptom of exposure
 - An entrant detects a dangerous or hazardous condition
 - An evacuation alarm is activated



Roles and training requirements for Entry Supervisors

Entry Supervisors must ensure the space is **safe to enter**.

- Know the hazards that entrants may face during entry, including the signs, symptoms, and consequences of exposure
- Understand how to **control or eliminate** hazards associated with the space
- Verify, by checking that the appropriate entries have been made on the entry form, that all tests specified by the entry form have been conducted and that all procedures and equipment specified by the form are in place **before signing** the entry form and allowing entry to begin
- Inform entrants and attendants about the **hazards and conditions** associated with the space and the methods used to eliminate or control the hazards
- Terminate the entry and cancel the entry form as required by the entry procedures
- Call 9-1-1 for police assistance if unauthorized persons refuse to leave the space.
- Reevaluate the conditions within the space whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space.

Rescue

Before entering a permit space, develop and implement procedures to remove entrants in the event of an emergency or when they are unable to evacuate without outside assistance. Rescue procedures must include:

- A process for summoning rescue and emergency medical services.
- A way for the Safety Data Sheet (SDS) or other similar written information be kept at the worksite and be made available to the medical facility treating an exposed entrant.
- Where feasible, use non-entry retrieval systems or methods whenever an authorized entrant enters a permit space.

Module 1: Progress Check

1. For every initial victim in a permit space, how many would-be rescuers are killed (on average)? **2**
2. List some common hazards that prevent self-rescue:
Oxygen deficient, toxic, or explosive air; engulfment; electrocution; entrapping shape
3. Is a 55-gallon drum a confined space? **No**
Why? **Not large enough to enter**
4. A confined space becomes a permit-required confined space when there is a :
Serious safety hazard

Module 1: Progress Check

	Entrant	Attendant	Entry Sup.
Know the hazards including signs of exposure.	X	X	X
Inform entrants about the hazards and conditions associated with the space...			X
Be able to use all the safety equipment.	X	X	X
Ensure that all entry procedures are completed and the space is safe to enter.			X
Maintain communication.	X	X	
Monitor entrants.		X	
Remain at the entrance		X	
Sound the alert if hazards arise that are not listed on the entry form	X	X	X
Contact the rescue team (in an emergency)		X	

Module 2: Hazards

- Engulfment
- Configuration
- Atmospheric
- Other Hazards
- Symptoms of exposure
- Progress Check

Hazards we must evaluate for include:

- **Atmospheric Hazard**
(oxygen, CO, H₂S, LEL)



- **Engulfment Hazard**,
material that could trap, bury, or asphyxiate
(sewage, sludge, water)



- **Configuration Hazard** (grit channels)



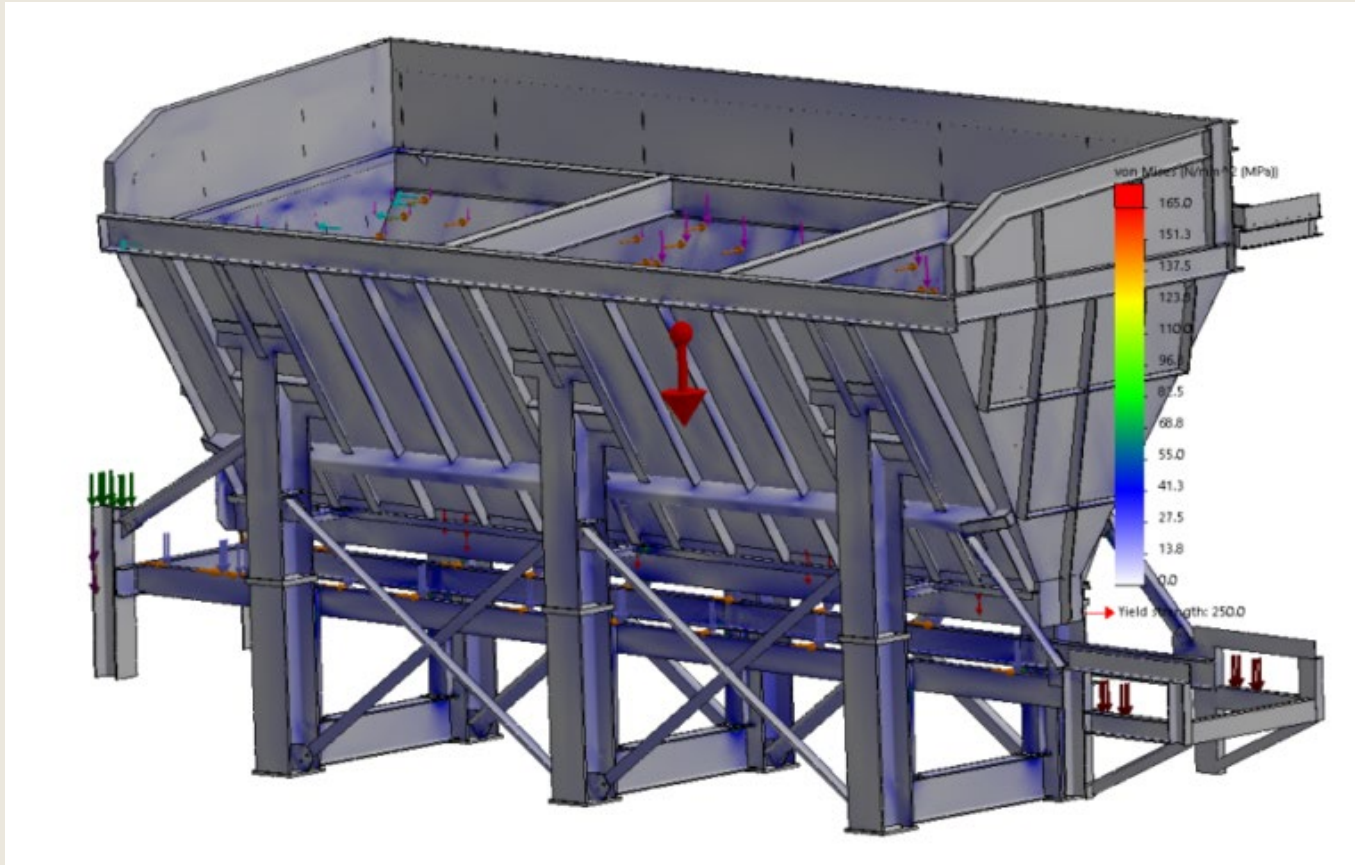
- Any **other** recognized serious safety or health hazard (hazardous material, heat, loud noise)

Engulfment Hazard

- The surrounding & effective capture of a person by a liquid or finely divided (flowable) solid substance that can:
 - *Be aspirated to cause death by filling or plugging the respiratory system*
 - *Exert enough force on the body to cause death by strangulation, constriction, or crushing.*
- Water or sewage flow
- Loose, granular materials stored in bins and hoppers – filter media, grain, sand, coal, etc.
- Crusting and bridging below a worker
- Flooding of confined space

An engulfment hazard exists if, under the **worst-case** scenario, we could not rescue a **face-down**, unconscious entrant before the space filled with enough liquid to drown them.

Configuration Hazard



Has an **internal** configuration such that an entrant could be trapped or asphyxiated by

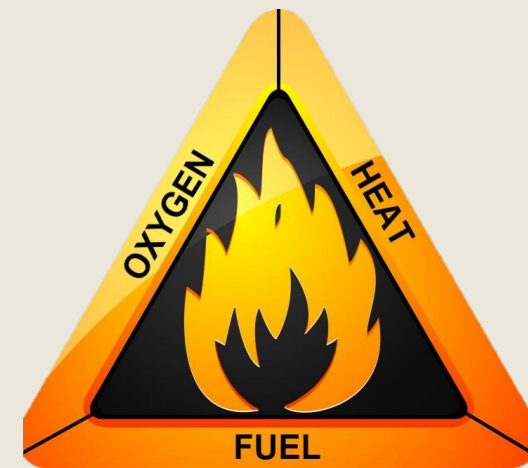
- inwardly converging walls, or
- a floor which slopes downward & tapers to a smaller cross-section

Hazardous Atmosphere

1. Flammable gas, vapor, or mist in excess of **10%** of its LEL
2. Airborne dust at a concentration that meets or exceeds its LEL (Rule of thumb: vision at **<5'**). Can create explosive conditions by holding/discharging static.
3. Oxygen **<19.5% or >23.5%**
4. Atmospheric concentrations of substances above PEL (Permissible Exposure Limit)
5. Other atmospheric conditions: IDLH (**immediately dangerous to life or health**). Standing **water** and excessive oxidizing (rust) can create oxygen deficient environments and should be considered in hazard analysis.

Flammable Atmospheres - LEL

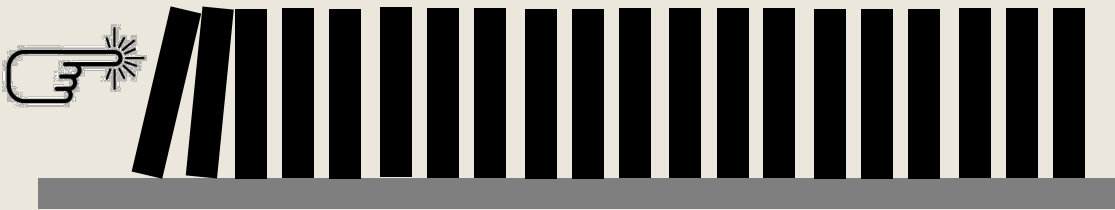
- Critical Factors:
 - **Oxygen** content in the air
 - Presence of a flammable gas, or vapor
 - Presence of dust (visibility of 5' or less)
- Proper air/gas mixture is a condition for an explosion
- Typical Ignition Sources:
 - Sparking or electric tool
 - Welding / cutting operations
 - Smoking



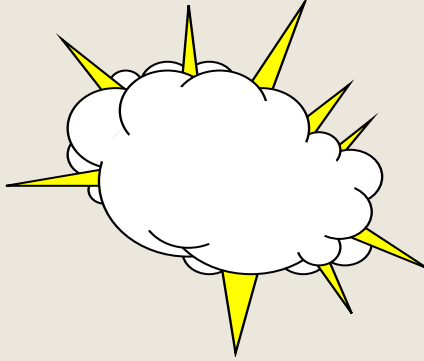
To burn, a molecule must ignite the one next to it.



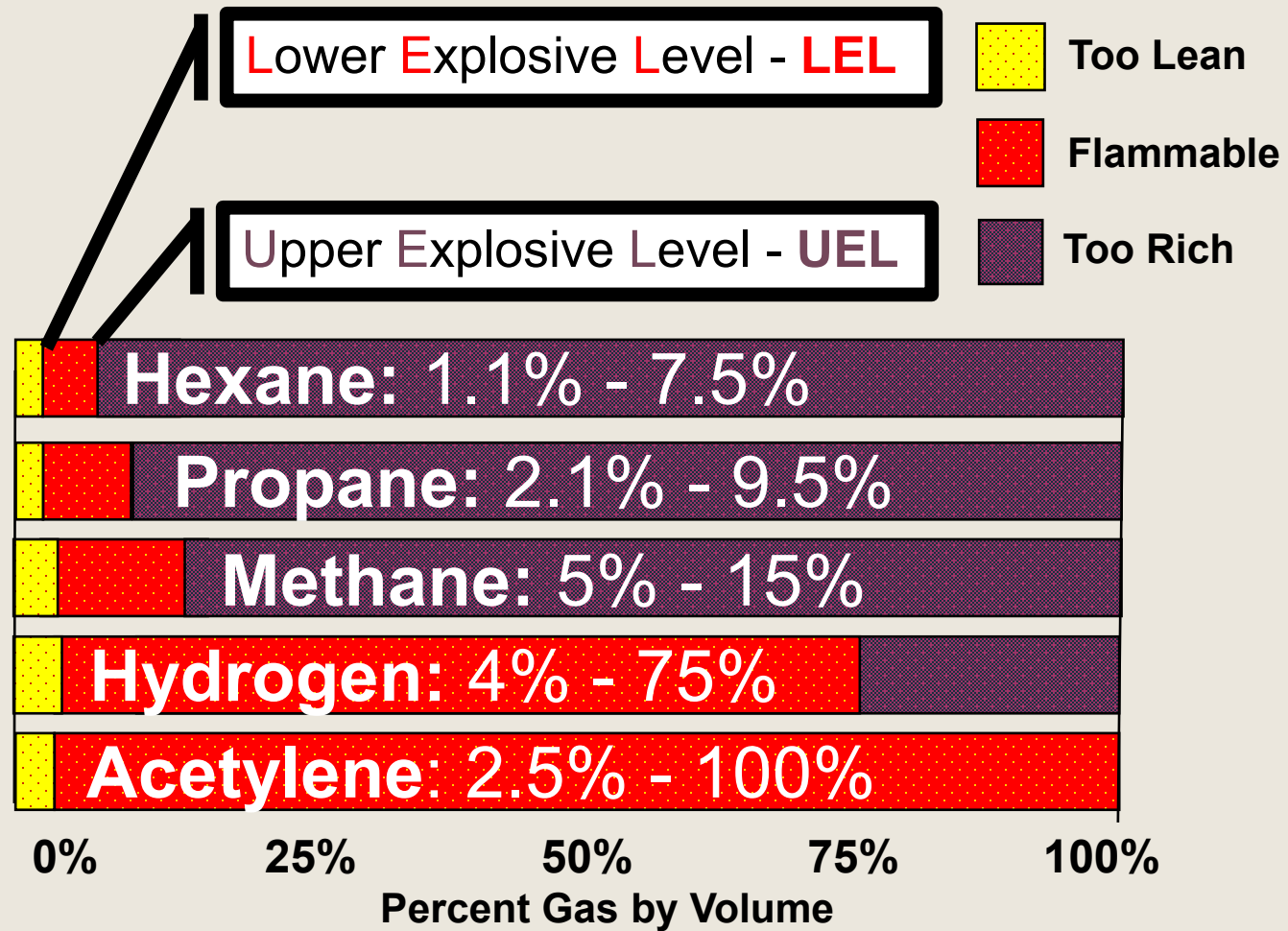
Too Lean



Too Rich

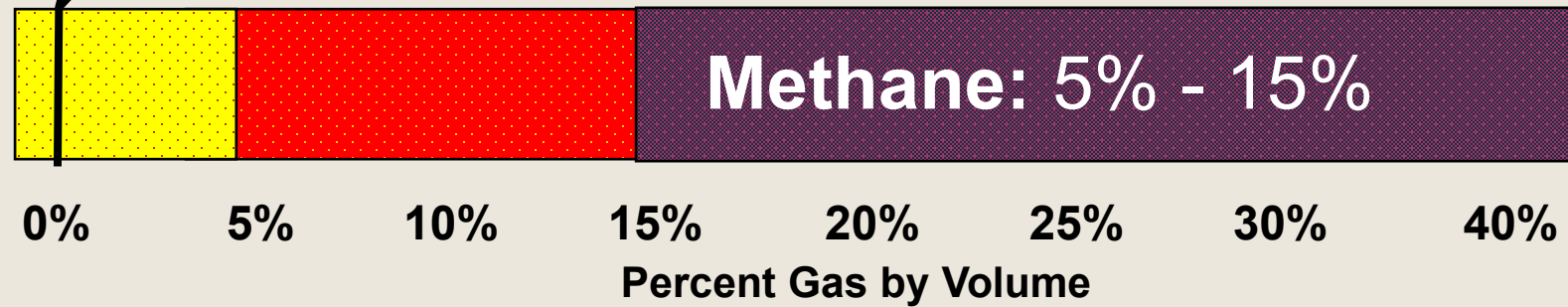


Upper and Lower Explosive Levels



What's the LEL of a 1% methane/air mix?

- Too Lean
- Flammable
- Too Rich



20% LEL

Other Hazards

- Noise
 - Amplified due to acoustics within the space
 - Damages hearing; affects communication
- Temperature
 - Extreme heat and cold
 - Steam cleaning
 - Wearing **PPE** can cause over-heating. Staff need to take breaks.
- Slick / Wet Surfaces (moss, ice, grease)
 - Slips and falls
 - Increased chance of electric shock
- Falling Objects
 - Topside openings expose workers inside confined space to falling objects

Oxygen Deficient Atmospheres

19.5 %	Minimum acceptable oxygen level.
15 - 19%	Decreased ability to work strenuously. Impaired coordination. Early symptoms.
12-14%	Respiration increases. Poor judgment.
10-12%	Respiration increases. Lips blue.
8-10%	Mental failure. Fainting. Nausea. Unconsciousness. Vomiting.
6-8%	4-5 minutes - possible recovery 6 minutes - 50% fatal 8 minutes - fatal
4-6%	Coma in 40 seconds. Death.

Oxygen Enriched Atmospheres

- Oxygen level above **23.5%**
- Causes flammable and combustible materials to burn violently when ignited
 - *Hair, clothing, materials, etc.*
 - *Oil soaked clothing and materials*
- Never use pure oxygen to ventilate
- Never store or place compressed tanks in a confined space

Hydrogen Sulfide – H₂S

- Decomposition of materials, human waste
- Naturally present in some oil/gas reservoirs
- Rotten egg odor at low concentrations – likely no smell at high concentrations
- Heavier than air, so it sinks into low spaces.

PPM Effect

Time

10	Permissible Exposure Level	8 Hours
20 - 100	Mild Irritation - eyes, throat	1 Hour
100 - 250	Headache , Cough, Nausea	1 Hour
250 – 500	Difficulty breathing, Fluid in lungs, Vomiting, Dizziness, Loss of coordination	1/2 – 1 Hour
500 - 750	Stumbling, Collapse	30 Minutes
>1000	Unconsciousness, Death	Minutes

In biogas, H₂S can be in concentrations up to 1,500 ppm which is why it is important to be aware of any locations where H₂S can settle into lower lying areas.



Carbon Monoxide – CO

- Odorless, colorless gas
- It is a combustion by-product
- You can quickly collapse at high concentrations

PPM	Effect	Time
50	Permissible Exposure Level	8 Hours
200	Headache , discomfort	3 Hours
600	Drowsiness, Rapid breathing	1 Hour
1000-2000	Slight heart palpitation	30 Mins.
1000-2000	Stagger / Loss of Coordination	1 1/2 Hours
1000-2000	Impaired judgement, Shortness of breath, blurred vision	2 Hours
2000-2500	Unconsciousness, Death	30 Mins.



Toxic Atmospheres can come from:

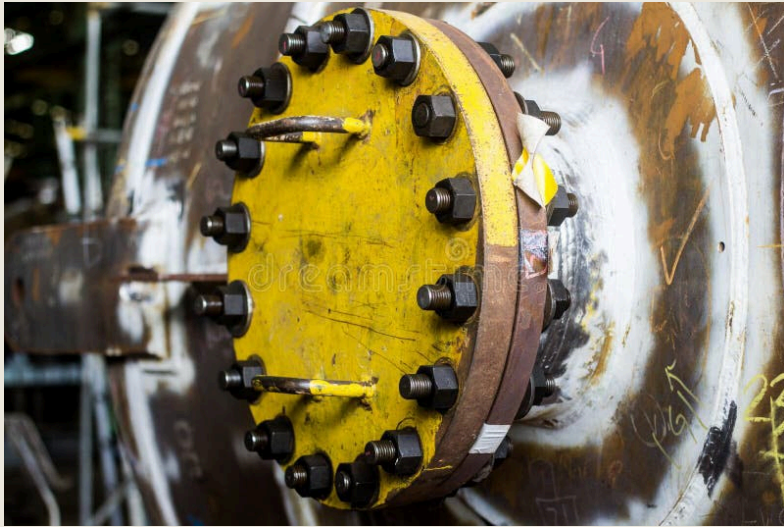
- Product stored in a **confined space**:
 - Gases released when cleaning
 - Materials absorbed into **walls** of confined space
 - Decomposition of materials in the confined space
- Work performed in a confined space:
 - Welding, cutting, brazing, soldering
 - Painting, scraping, sanding, degreasing, **pressure washing**
 - Sealing, bonding, melting
- Hazards from areas adjacent to a confined space

Module 2: Progress Check

- 1) How can noise impact safety in a confined space? **By affecting communication**
- 2) List some symptoms of Hydrogen Sulfide exposure. **Eye & throat irritation, headache, cough, nausea, difficulty breathing, vomiting, dizziness, loss of coordination**
- 3) Is an atmosphere with 19% oxygen safe? **No**
- 4) A high level of methane in the air means there is a low level of oxygen.
- 5) What happens if you introduce a spark in a vessel with 110% LEL? **The vessel explodes**

Module 3: Making Safe Entries

- Elimination and Control of Hazards
- Permit Entry Procedures
- Alternate Entry
- Cancelling Entry
- Prevention of Unauthorized Entry
- Employee Rights
- Progress Check



How to Eliminate or Control Hazards

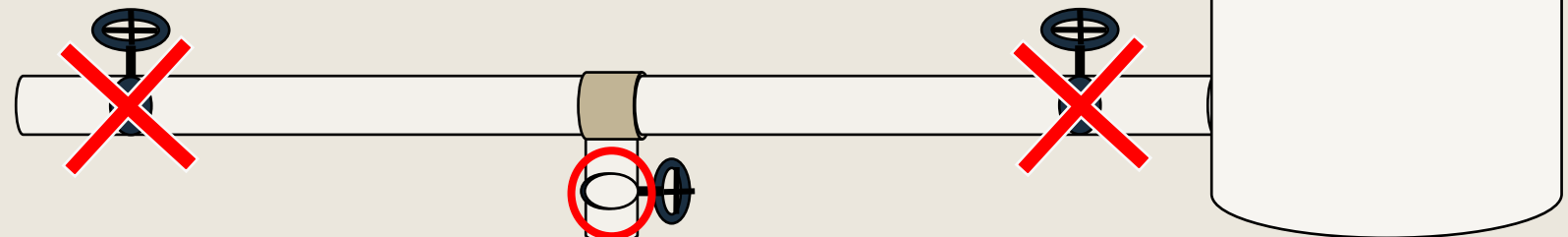
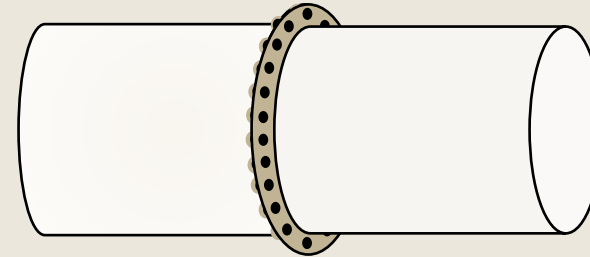
- Atmospheric hazards are controlled by **continuous mechanical ventilation**.
- Lockout is used for hazardous energy control
- Eliminate engulfment hazards – **double block and bleed** or blank/blind flange whenever possible. When only one valve can be closed and locked to control an engulfment hazard, an entry plan must be created. Entry plan is described in the Wastewater procedures section.
- Turn source of noise off
- When possible clean/remove slippery surface before entry
- Platform for sloped floors

Isolation

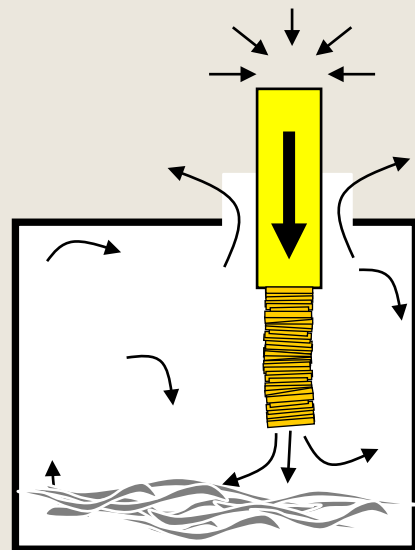
The process by which a permit space is removed from service and completely protected against the release of energy and material in the space.

Examples include:

- Barricades and Guardrails
- Lockout/Tagout
- **Ventilation**
- Draining
- Flushing/Cleaning
- Cooling/Heating

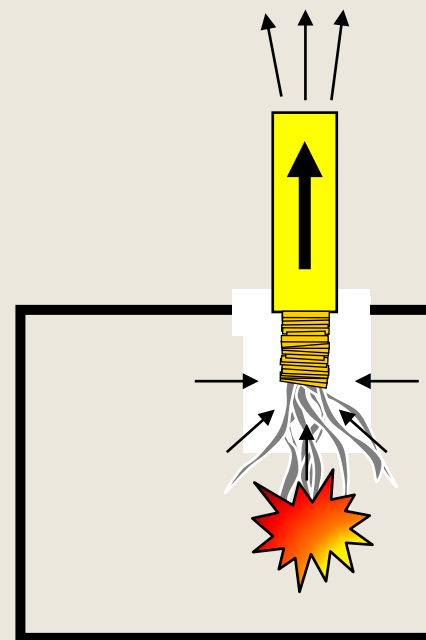


Supply or Exhaust



Supply
(Dilution)

- No single **toxin source**
- Creates turbulence

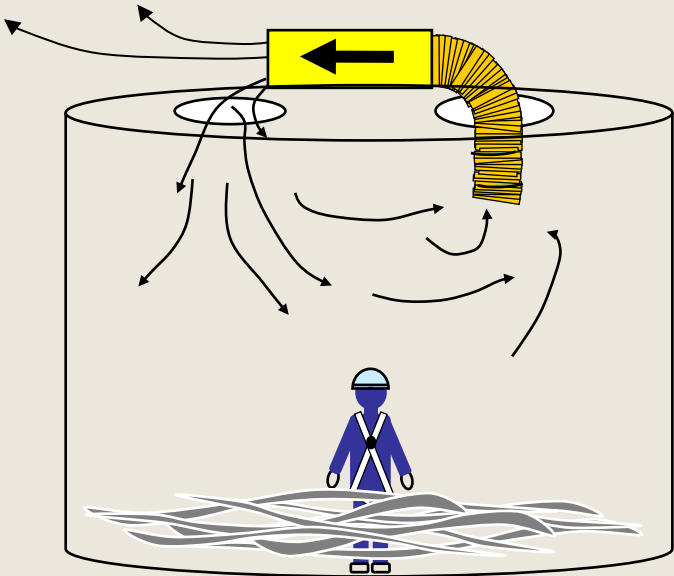


Exhaust
(Source Capture)

- Toxins produced at a **single point**
- No turbulence

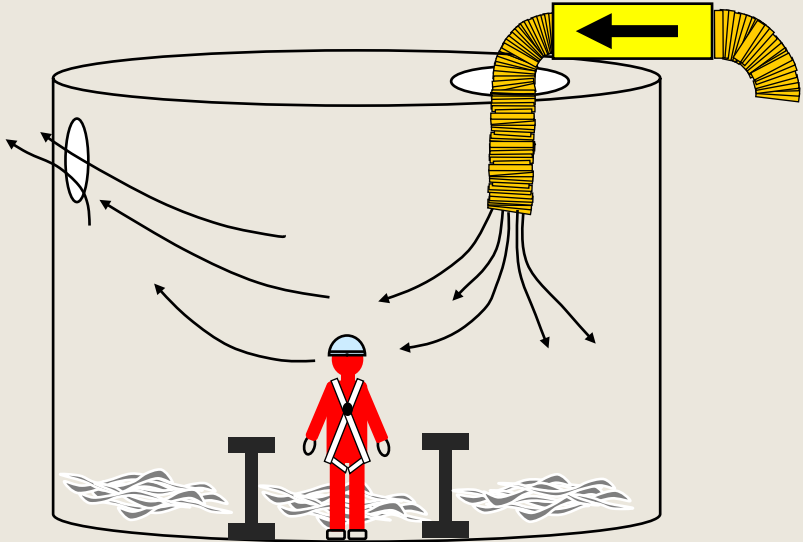
Ventilation Practices

Avoid Short Circuiting



May need additional duct on exhaust

Break Up Pockets



May need a rope tied to duct to direct air flow

Opening the Space

Any opening in a walking-working surface poses an **extreme fall hazard.**

So we must **install temporary guardrails, covers, or assign a safety watch.**



Identifying Permit-Required Confined Spaces with Signs

- Employees must be able to recognize permit-required confined spaces. In addition to training, signs, labels or tags may be used.
- Only authorized employees, those that have been **trained** as entrants by Wastewater and approved by their supervisor, are allowed to enter permit required spaces.



Permit Entry Procedures

- Have and follow the written program
- Ensure all participating staff are **trained** for their roles as Entrants, Attendant, or Entry Supervisor.
- Obtain a permit
 - *Evaluate the hazards of the space.*
 - *Evaluate hazards of the work to be performed.*
 - *Identify safe entry conditions.*
 - Eliminate and/or control the hazards, as able.
- Have trained rescue crew present.
- Identify **PPE** that will be required for the work.





Alternate Entry

- Alternate Entry is a specific procedure for entering a Permit Required Confined Space without a full permit due to all hazards being controlled or eliminated prior to entry. This does not mean entering without any paperwork or a plan. The “permit” method of entry has more requirements to it due to uncontrolled hazards being present. Alternate Entry has fewer requirements due to the elimination and/or control of hazards prior to entry.
- Conditions required to be met for Alternate Entry include:
 - *Eliminate all hazards*
 - OR
 - *Eliminate all **physical** hazards in the space and **control** all atmospheric hazards with continuous ventilation and monitoring*
- For Alternate Entry, OR-OSHA requires documentation of each entry. The Wastewater Division utilizes an Alternate Entry Form for this step. We will review this form in the Wastewater Procedures portion of this training.

At the Wastewater Division, we only enter Permit Required Confined Spaces under Alternate Entry conditions.

Alternate Entry continued

The required items that must be documented are as followed, all of which are captured on our Alternate Entry Form:

- The location of the space
- The hazards of the space
- Measures taken to eliminate the hazards
- Measures taken to control the atmospheric hazards
- The identity of the direct-reading instruments used to test the atmosphere
- The results of the atmospheric testing
- The date of entry
- The duration of the entry
- Any and all conditions that require the evacuation of the space
- The name, title, and signature of the person responsible for ensuring the safe entry conditions



Canceling Entry

Person authorizing entry cancels the permit or form.

- Upon completion of the confined space work or expiration of the confined space entry form, and after all entrants have exited the permit space, the individual who authorized the entry shall cancel the form.
- No re-entry shall be made by any persons until a **new** Permit or Alternate Entry Form is issued.
- Cancelled PERMITS are to be retained for one **year**.
- Cancelled Alternate Entry Forms are kept for a minimum of one **month**.
- If any employees are exposed to atmospheric hazards during entry that exceed the Time Weighted Average exposure threshold, the permit or form then becomes an exposure record and must be kept for a minimum of thirty years.

Prevention of Unauthorized Entry

- The unauthorized entry into any confined space is strictly prohibited under any circumstance. Employee's entering without authorization can result in disciplinary action up to, and including, termination (APM 12.1.F).
- Prevention of unauthorized entry will be aided through training and posting of signs.
- Any person observing unauthorized entry or unsafe work practices in or around confined spaces will be responsible to warn the workers performing the confined space work of the perceived hazard(s) or immediately notify their supervisor or lead worker. If the person refuses to leave the space, call 9-1-1 for police
- The entry supervisor shall terminate entry and cancel the entry when a condition that is not allowed under the entry form arises in or near the confined space.
- Confined spaces accessible by the general public must be locked.

Employee Rights

- **The OSHA standard adds the term authorized employee representatives** and establishes that employees or their authorized representatives have the opportunity to observe pre-entry testing and subsequent monitoring of a confined space.
- In addition, employees or their representatives may request re-evaluation of the testing and monitoring.

Module 3: Progress Check

1) What are examples of steps taken to isolate a permit space?

Barricade/guardrail, LOTO, blind flange, double block and bleed, ventilation

2) For entry into a space like a digester, which is the correct method of ventilation?

Supply

3) What authorization does an employee need to enter a permit-required confined space?

Training by the Wastewater Division and supervisor approval

4) What is the biggest difference between entering by a permit versus entering under Alternate Entry conditions?

Under Alternate Entry, all hazards have been eliminated or controlled prior to entry

5) Who cancels entry? **The Entry Supervisor**

MODULE 4: WASTEWATER PROCEDURES

Now that we've gone over the overarching OR-OSHA rules pertaining to Confined Space Entry, we are going to review the Wastewater Division's specific procedures and dive a bit deeper into some of the concepts already covered.

From this point forward we are only training on processes that are specific to the work conducted at the City of Eugene Wastewater Division.


Permit Required Confined Spaces at WW

All Permit Required Confined Spaces are marked with **signage**.

Examples include:

- Wet Wells
- **Vaults**
- Tanks
- Grit Channels





Spaces that become Permit-Required when there is no power

- Pump stations with wet wells in the building (Barger/Greenhill, Glenwood)
- Tube stations and vaults that have **ventilation system**.
- Pump stations that are underground (Irvington, West Irwin, Willakenzie, Terry St.).
- Heavy Solids building (Secondary) - Dungeon.
- **Utilidor**
- Lower final bisulfite area
- BMF Valve Vault Room

Always check that the ventilation is working prior to entering these spaces by **feeling for air coming out of the exterior air vents or opening the door and listening prior to entry. After power loss, forced air ventilation is required prior to entry.**

Take the vault lock with you or lock it prior to entering to ensure no one locks you inside.

Entry Plan

When a single valve is the only control holding back an engulfment hazard from a confined space where staff will be entering, an entry plan is necessary. The entry plan needs to:

- Analyze and document the **hazards** of the space
- Document hazard mitigation strategies such as:
 - *Blank flanging*
 - *Pipe removal*
 - *Pump **lockouts***
 - *Rescue lifeline setup and positioned for use*
 - *Multiple person entry*
 - *And all other hazard mitigations (continuous ventilation and air monitoring, electrical hazard lockouts, PPE, etc.)*
- Document entry and non-entry rescue plan in event of catastrophic valve failure
- Risk matrix for categorizing risk level of potential harm to entrants

Hazard Assessment & Mitigation

As covered earlier in this training, an assessment of hazards in the to-be-entered permit space must be conducted along with all mitigation methods to control atmospheric hazards and eliminate all physical hazards.

At Wastewater, we only enter using the Alternate Entry method. This method of entry does not require a **“permit”** but does require documentation. Under Alternate Entry, all hazards must be eliminated or controlled; there is not the possibility of entry into a confined space with uncontrolled hazards present.

We use the Confined Space Alternate Entry Form for documentation, including hazard assessment and mitigation strategies.

Engulfment Hazards can be difficult to analyze at Wastewater as our piping is so interconnected. Ensure to review corresponding Lockout Tagout procedures and consult with Operations to ensure double valving is possible.



Alternate Entry Procedures

- Obtain Confined Space Alternate Entry Form
- Survey the space prior to authorization to identify all hazards and how to mitigate them. To ensure all hazards have been identified and eliminated or controlled, a pre-entry planning meeting by involved workgroups will take place.
- Identify **PPE** that will be required for the work.
- Identify all lockout/tagout (LOTO) points and list them on the form. Use LOTO procedure, if **one exists for the space.**
- It is a Wastewater Division best practice to have two or more entrants for confined space entry work when feasible.
- Give copy of form to Operations prior to entry
- At completion of entry, give form to the Safety Manager



Alternate Entry Form

The Confined Space Alternate Entry Form (see next slide) is the only written form acceptable at Wastewater for use in authorizing entry into any permit required space.

The form must include:

- Location of the permit space.
- Purpose of entry.
- Entry date and the time employees will enter.
- Authorized entrants' names.
- Authorized attendants' names.
- Entry Supervisor's name and signature.
- Hazards in the space.
- How hazards will be controlled so that the space is safe to enter.
- Acceptable entry conditions.
- Testing data and tester's initials that certify the space is safe to enter.
- Names of emergency responders and instructions for contacting them.
- Communication procedures used by entrants and attendants.
- A list of all equipment, including PPE, necessary to ensure entrants' safety.
- A description of any other permits that entrants need to work in the space.

*A copy of the Form is given to Ops Console prior to work conducted at the Plant.

Alternate Entry Form

The form covers ONE confined space and cannot be used for entry into multiple spaces, even if they are similar. For example, if breaking the plane on multiple manholes for sampling, a new form is needed for each location.

Confined Space Alternate Entry Form

Breaking the Plane with Hand Only*

Permit Date: / / Start Time: AM PM Expires: AM PM or @ end of shift

Permit space to be entered (name and location of space):

Purpose of entry:

Names of trained, authorized individuals

- Entry supervisor: Authorized Entrants:
- Entry attendant*:

Emergency contact information

Emergency Responder: **Call 911 and state "Confined Space Rescue"**

WW Contact: Time:

Pre-entry requirements								
Requirements	Yes	No	N/A	Requirements	Yes	No	N/A	
Lockout - tagout/de-energize	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hot work permit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Purge, flush or drain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Fall arrest harness/lifeline/Davit	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Ventilation (natural or mechanical)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Personal protective equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Secure area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hardhat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Safe lighting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Gloves	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Non-sparking tools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety glasses	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Communication (Cell, Blow Horn, Radio)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Respirator, type <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Contractor employees involved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other PPE: <input type="text"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Possible atmospheric hazards	Yes	No	N/A
Lack of oxygen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Combustible gases/vapors/dust	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Toxic gases/vapors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Possible non-atmospheric hazards			
Noise	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Chemical contact	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Electrical hazard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mechanical exposure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Temperature extreme	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Engulfment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Entrapment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other non-atmospheric hazard:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*For breaking the plane with hand only, attendant is not required.

Pre-entry checklist

Do not enter this permit space until the following "needs action" conditions are corrected.

OK	Needs Action
<input type="checkbox"/>	<input type="checkbox"/> Bump testing has been performed this shift on the gas monitor before use. If so, by whom? <input type="text"/> Monitor calibration date checked?
<input type="checkbox"/>	<input type="checkbox"/> A minimum of two employees must be assigned to work involving permit space entry. One employee must remain outside the permit space at all times. <i>This is not required when breaking the plane with hand only.</i>
<input type="checkbox"/>	<input type="checkbox"/> The surrounding area must be surveyed to show that it is free of hazards such as drifting vapors from tanks, piping, sewers, or vehicle exhaust.
<input type="checkbox"/>	<input type="checkbox"/> The atmosphere will be continuously monitored while the space is occupied, if required by entry procedure.

Alternate Entry Form – page 2

Atmospheric Testing/Monitoring

If possible, test air BEFORE opening space. (Most fires / explosions occur at point/time of entry.) Initial air test must be performed at upper, mid, & lower levels of the confined space. Monitor at least every 15 minutes.

Space-monitoring results	Oxygen %	LEL %	H ₂ S ppm	CO ppm
Permissible exposure entry levels	19.5% to 23.5%	Less than 10%	10 ppm	35 ppm
Initial				
15 min.				
30 min.				
45 min.				
60 min.				
1 hr 15 min				
1 hr 30 min				
1 hr 45 min				
2 hrs				
2 hrs 15 min				
2 hrs 30 min				
2 hrs 45 min				
3 hrs				
3 hrs 15 min				
3 hrs 30 min				
3 hrs 45 min				
4 hrs				
4 hrs 15 min				
4 hrs 30 min				
4 hrs 45 min				
5 hrs				
5 hrs 15 min				
5 hrs 30 min				
5 hrs 45 min				
6 hrs				
6 hrs 15 min				
6 hrs 30 min				
6 hrs 45 min				
7 hrs				
7 hrs 15 min				
7 hrs 30 min				
7 hrs 45 min				
8 hrs				

This entry has been terminated for the following reason:

Work completed Canceled Time: Note:

Time: Date: / /

Entry Supervisor's signature

Time: Date: / /

Section Supervisor's signature (Canceled Entry Review)

Canceling the Alternate Entry Form

Person authorizing entry cancels the form.

- Upon **completion** of the confined space work or **expiration** of the confined space entry form, and after all entrants have exited the permit space, the individual who authorized the entry shall cancel the form.
- The Ops Console is to be notified that the confined space work has been completed for permit-required confined space entry that occurs at the Plant. For entry that occurs at BMF or Pump Stations, staff must notify their supervisor or lead.
- **No re-entry** shall be made by any persons until a new Alternate Entry Form is issued.
- The canceled entry form is given to the Safety Manager and retained for at least one month.
- Safety Manager audits entry forms monthly and will follow up with employees on any unusual entry conditions or if the Form was not executed properly. Incorrect entry can result in reassigning required trainings, documentation, and/or disciplinary action as appropriate (APM 12.1.F). Staff are required to follow all safety procedures and ask questions if anything is unclear.

Entry Supervisor Must Sign Form

- The Entry Supervisor is not necessarily the same as the work section supervisor or lead. Entry Supervisor refers to a person with a particular set of responsibilities and **associated training**.
- The Entry Supervisor authorizing the entry may sign the Alternate Entry Form allowing entry **after** initial atmospheric testing and all other actions and conditions necessary for safe entry have been performed.
- Entry Supervisors may also perform the confined space work as an attendant but not as an **entrant**.
- A safety contact must have a radio on them, in addition to their work cell phone, and be available throughout the duration of the confined space entry. This is so if the attendant is on the phone with 9-1-1, they have an additional means of communicating with their safety contact without getting off the phone with 9-1-1. *Radio is not required for Breaking the Plane Only circumstances.

Breaking the Plane ONLY

- When a confined space will be breached solely by breaking the plane with **just a hand** (NOT entering), the Alternate Entry form is used and the “Breaking the Plane Only” checkbox is checked. At wastewater certain vaults (e.g. communication vault) are accessed in this manner and the Sampling Team may conduct work in this manner.
- Breaking the Plane procedures vary from full entry procedures in several significant ways. For example: **an attendant is not required; rescue procedures are not required; and there are fewer documentation requirements.**
- You need to do the following:
 - *Eliminate all hazards*

OR

 - *Eliminate all physical hazards in the space and **control** all hazardous atmospheres with continuous ventilation*
- The Entry Supervisor authorizes alternate entry procedures and is responsible for ensuring safe entry conditions.
- Completed forms should be turned in to the Safety Manager.

Personal Protective Equipment (PPE)

PPE does not eliminate or control a hazard, but it does provide extra protection to the employee **when used properly** and in the correct situations.

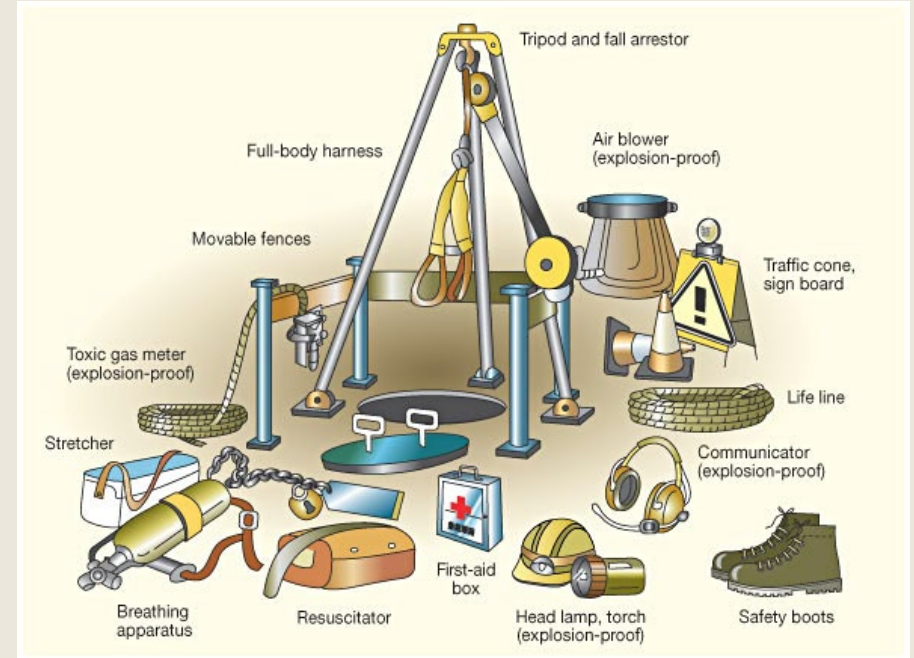
Respirators are for particulate filtration. Respirators do **not** protect from atmospheric gas hazards.

See WW-1253 PPE Procedure for a comprehensive overview.

Obtain Gas Meters, PPE, and Other Safety Equipment

The following equipment are provided at no cost to the employee:

- Testing & monitoring equipment
- Lighting equipment
- Ventilation equipment
- Communication equipment: phone, radio, blow horn
- PPE (safety glasses/goggles, gloves, hard hat, etc.)
- Respirators (must follow Respiratory Protection Program)
- Barriers & shields
- Ingress/egress equipment (ladders, etc.)
- Rescue & emergency equipment
- Rope
- Other needed entry/rescue equipment



All equipment must be maintained and used in accordance with the instructions from the manufacturer.



Ventilate and Test the Atmosphere.

Ventilate and Test the Atmosphere. Prior to authorization or entry, a pre-entry test with an approved meter that has been bump tested for oxygen content, flammable gases and vapors (LEL), for potential toxic air contaminants (H₂S), and carbon monoxide (CO), in that order must be performed.

- Before opening the cover; when possible, test the atmosphere for Oxygen, LEL, H₂S, and CO prior to opening the space via a small opening or if possible, sliding the cover enough to test the air.
- After removing the cover, place the appropriate **barricades**.
- Begin forced air ventilation if necessary. Take care to ensure the fan is not located near a vehicle exhaust or any other contaminant.
- Now test the atmosphere with an approved meter for Oxygen, LEL, H₂S, and CO. Testing at approximately every 4 feet of the confined space is necessary for potential stratification. For example, methane rises and H₂S sinks. Personal meters are to be worn by the entrant(s). If there are not enough personal meters, entrant(s) may not wear the personal meter as long as they are working right next to an entrant wearing a personal meter.
- If the air is still reading atmospheric hazards out of the acceptable range, continue forced ventilation and retest until atmospheric hazards are **controlled**.

No entry will be made into a **hazardous atmosphere**



Confined spaces that contain a hazardous atmosphere must be completely ventilated, or otherwise rendered safe, and retested for the presence of a hazardous atmosphere prior to authorization of entry.



At Wastewater we never enter a Permit Required Confined Space if uncontrolled hazards are present. Ensure the conditions of **Alternate Entry** are met prior to entry.

The attendant shall continuously monitor the atmospheric conditions

- The attendant shall continuously monitor the atmospheric conditions of the confined space, record readings every **15-minutes** on the entry form, and must instruct all entrants to exit the confined space if hazardous atmospheric conditions begin to develop.
- If after entry, an atmospheric hazard appears, the attendant must immediately revoke the entry form and no re-entry may be made until a **new** Alternate Entry Form is obtained.

Attendant Responsibilities specific to Wastewater Division procedures

- The attendant will use a cell phone or **radio** to notify their supervisor/lead immediately prior to initial entry.
- The attendant will have a radio with them for communicating emergencies to the supervisor/lead and Operations Console.
- Ops Console is the emergency contact for work done at the Plant. They are familiar with the confined space locations and capable of guiding emergency vehicles to the specific location. Ops Console is responsible to maintain contact availability for the duration of the confined space work.
- For BMF and Pump Stations, the emergency contact is the work section supervisor or lead.

In case of emergencies, the Attendant will call 911 and state “Confined Space Rescue**”. Then contact the emergency contact and apprise them of the emergency. This rescue plan is for Alternate Entry entries only.**

Entrants must monitor air

- Entrants must wear a personal gas meter to continuously monitor for the presence of hazardous atmospheric conditions.
- If multiple staff are working **right next to each other**, one personal meter can be used.
- Personal meters are not in lieu of space meters, they are **in addition** to the space meters. Test the atmosphere for all identified atmospheric hazards before entering the space.



Gas Meters

- Wastewater has three types of gas meters: pump/space units, personal gas meters (PGM), and purging meters. Both pump units and PGM types can be used as a **personal** meter. The PGM, non-pump units, are smaller and lighter, they cannot be used to monitor the entire space by the Attendant. PGMs are to be used by the person going into the hole.
- X-doc bump stations store daily calibration memory of the meters. Data is extracted annually to USB storage and held by the Mechanical Maintenance Supervisor.
- Large space: use **multiple** pump meters.
- Clean the meter prior to returning to the charging station.
- Purging meters are not covered in this training, but staff need to know that purge meters are programmed to report on gases differently and specific training is needed prior to use.

Non pump gas meter

Pump gas meter



Gas Meter Use

- **Bump testing** of air monitoring equipment is required prior to every use within a shift. Keep in mind that a bump test confirms that the monitor reads a given substance, as opposed to zeroing, which means nothing is detected.
- If the bump test fails or other failure, put the meter on Mechanical Maintenance Supervisor's desk with a Post-it note stating the bump test failed or other failure details.
- Calibration gases must be within their expiration dates.
- See the Mechanical Maintenance Supervisor for equipment specific training and questions. (This is required for initial completion of this training.)

Pump gas meter





GAS DENSITY

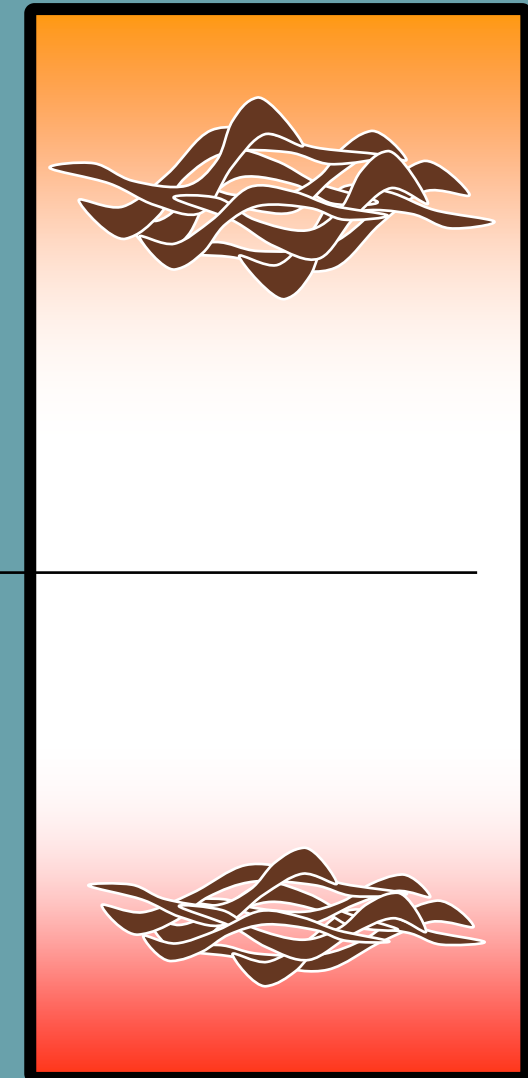
Always test the air at various levels to be sure that the **entire** space is safe.

Good air near the opening does NOT mean there is good air at the bottom!

Hydrogen
Ammonia
Acetylene
Methane
CO
Nitrogen

AIR

H₂S
Argon, CO₂
Propane
SO₂
Chlorine



Hot Work in Permit Required Confined Spaces

- **No hot work is to be performed unless authorized by permit.** If hot work is to be performed in the permit space, a separate **Hot Work Permit** must be completed and attached to the entry form. This is necessary to prevent explosions where an ignition source is introduced into an explosive gas environment.
- Obtain a Hot Work Permit.
- Follow permit required confined space entry procedures.
- Monitor atmosphere for LEL, oxygen content, CO, H₂S or other toxic gases.
- Follow Lockout Tagout Procedures.
- Provide means for readily turning off power, gas, and other supplies from **outside** the confined space.
- Protect or remove any hazardous materials or materials which may become hazardous when exposed to hot work.
- Continuously ventilate and monitor air to ensure fumes and gases do not exceed safe exposure limits. Ensure a personal meter is also worn.



Hot Work in Permit Required Confined Spaces

- continued

- 29 CFR 1910.252(c) and 1926.353(c) require the use of local exhaust ventilation or supplied air respiratory protection when hot work is performed in a confined space where there is a potential for exposure to fluorine compounds (fluxes and rod coatings), zinc, lead, cadmium, or mercury. When beryllium is present, use both local exhaust and a supplied-air respirator. **Wastewater staff are not trained or equipped to use supplied-air respirator.**
- 29 CFR 1926.353(c) requires the use of local exhaust ventilation or supplied air respiratory protection when hot work is performed in a confined space where there is a potential for exposure to chromium or when Gas Metal Arc Welding is performed on stainless steel. **Wastewater staff are not trained or equipped to use supplied-air respirator.**
- If above situations do not apply, use a NIOSH approved Powered Air Purifying Respirator (PAPR) that is compatible with a welding helmet. A PAPR is not a supplied-air respirator.
- Place as much **equipment** as possible outside the confined space. Keep unnecessary personnel and equipment out of the way. Ensure equipment is not blocking the exit route or would hinder rescue efforts.

Hot Work Permit

HOT WORK PERMIT

No work involving open flame or hot sparks may be performed in the Digester Area or gas flare building, or in any Confined Space without an Authorized Hot Work Permit. The operation of electrically powered drills and similar tools that do not cast hot sparks within the normally occupied areas at these locations is exempt.

After any required training, this form may be issued to City personnel, contractors, or others as appropriate.

Date Permit is Valid (one day only) _____

Permit Period

Start Time _____

Expiration Time _____

Job Type (circle then list type under work description)

Gas or Electric Welding

Abrasive Grinding

Gas or Electric Cutting

Open Flame Soldering

Other Spark Producing or Open Flame Work (specify) _____

Work Description _____

Work Location _____

Worker(s) Assigned _____

Precautions - Check To Indicate Required

* To Be Completed By Supervisor. See Notes on Back. *

- | | |
|--|---|
| <input type="checkbox"/> Purge lines with inert gas? | <input type="checkbox"/> Shield welding arc? |
| <input type="checkbox"/> Test jobsite atmosphere at beginning of each shift? | <input type="checkbox"/> Confine hot sparks? |
| <input type="checkbox"/> Test jobsite atmosphere prior to job? | <input type="checkbox"/> Equipment grounded? |
| <input type="checkbox"/> Have standby fire extinguisher ready? | <input type="checkbox"/> Barricade work area? |
| <input type="checkbox"/> Perform 30-minute fire watch? | <input type="checkbox"/> Cable trays protected? |
| <input type="checkbox"/> Notify OPS Console prior to start of job? | <input type="checkbox"/> Lock-out equipment? |
| <input type="checkbox"/> Lock-out fan if work area is within 10' of an exhaust duct? | <input type="checkbox"/> Other _____ |

WORK MAY NOT BEGIN UNTIL ALL PRECAUTIONS ARE MET

Permit Authorized By _____

Gas Meter Information

Rescue

- For Confined Space Entry Rescue, we rely on the City of Eugene's Rescue Team, which is the Eugene Springfield Fire Technical Rescue Team. Call 9-1-1. **You must let the dispatcher know that it is a "confined space rescue". These words are critical for fast response.**
- Safety Data Sheet (SDS) are available online. Go to the Wastewater Home Page and click the SDS Online link. Review all hazardous chemical SDS **prior** to entering a confined space.
- If Alternate Entry conditions cannot be met, then a trained rescue team must be onsite for the duration of the entry. Contact your supervisor to coordinate this service.
- Wastewater will aid Fire Dept. by **participating** in periodic rescue drills.

Entrants must wear a harness with an attached retrieval line

- **Entrants must wear a harness with an attached retrieval line** except when the use of either causes a hazard or would not serve any useful benefit during rescue.
- Davit arm is located in the **Safety Trailer** to the west of Digester #4. This is a fall protection suspension system used by workers to complete tasks in confined spaces. Additional lifelines are in **Stores**.
- If the confined space work performed by the entrant is **6** feet or higher off the bottom floor of the space, e.g. working from a ladder, the entrant is required to utilize a lifeline and wear a full-body harness.
- Lifelines must be strong enough to provide fall arrest.
- Anchor points must be rated to withstand 5,000 lbs. of force.
- Inspect your harness before **every use**.
- If a retrieval line is not used, the entrants must still wear a chest or full-body harness.





No-Entry Rescue

When even the remotest possibility of an atmospheric hazard exists, **NO STAFF MAY ENTER TO PROVIDE AID.**

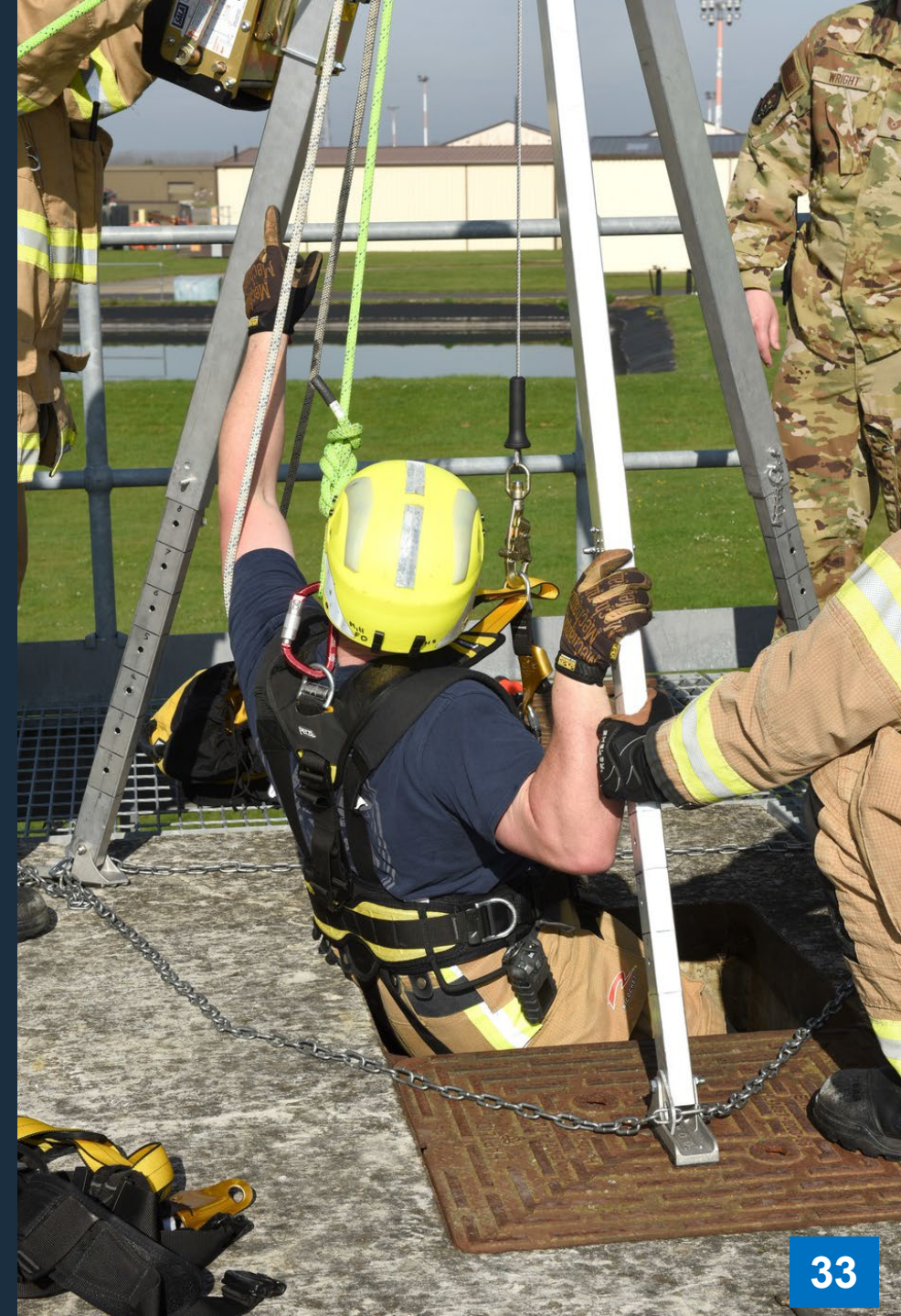
The only NO-ENTRY options for rescue are:

- Self-Rescue
- Use Davit arm to retrieve entrant using rope/harness

Entry Rescue

Entry Rescue means someone goes into the confined space. The rescuer must have equipment and training and follow all requirements of the OSHA rule. **No Wastewater staff are approved confined space rescuers.**

If an entrant needs to be rescued, the attendant is to call 9-1-1 and request a “Confined Space Rescue”. You will need to answer the following questions on the next slide.



Rescue: 9-1-1 Call

- Q: 9-1-1 What is the location of your emergency?
 - A: *410 River Avenue, Eugene at the Wastewater Treatment Plant.*
- Q: What is the nature of your emergency?
 - A: *We need a “**CONFINED SPACE RESCUE**”*
- Q: What is the depth of the confined space?
 - A: *Give your best estimate.*
- Q: What hazards are associated with the confined space?
 - A: *Describe current and potential atmospheric hazards. Fall from heights. Any equipment, temperature, or explosive hazards, and any other hazards associated with the space and situation. Refer to the Entry Form.*

Entry Rescue: Additional Entrant

- If any potential for an atmospheric hazard exists (CO₂, H₂S, LEL, low/high oxygen) NO WASTEWATER EMPLOYEE IS TO ENTER TO PROVIDE AID. Even if the entrant was injured for another reason (tripped and fell), if evidence exists that there could also be an atmospheric hazard, DO NOT ENTER.
- If there is absolutely no evidence that an atmospheric hazard is present and the entrant was clearly injured for an unrelated reason (severely bleeding from an equipment injury, fall from heights, conscious with a broken bone and can communicate) an additional entrant other than the attendant may be permitted to enter and provide aid. This may only happen by following these steps:
 1. *Radio the supervisor/lead – say you need a second entrant to provide medical aid*
 2. *Supervisor to analyze for any potential atmospheric hazard. If none exists, will add entrant to the entry form for entry and advise second entrant to enter cautiously, with **ALL** required PPE (harness, PGM, safety boots, hearing protection, etc.)*
 3. *Second entrant to provide aid until Fire Department arrives to conduct rescue*

Contractors Involved in Confined Space Entry

When the Division Staff arranges to have employees of another employer (contractor) perform work that involves permit space entry, the designated plant representative shall:

- Inform the contractor that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements of 437-002-0146 and 29 CFR 1910.146. If the work involves modification or new construction, only 29 CFR 1926, Division 3 standards may apply to the contractor.
- Inform the contractor of the elements, including the **hazards** identified and the plant's experience with the space, that make the space in question a permit-space.
- Inform the contractor of any precautions or procedures that the Division has implemented for the protection of employees in or near the permit spaces where contractor personnel will be working.
- A designated plant representative will **coordinate** entry operations with the contractor when both plant and contractor employees will be working in or near permit spaces as required by paragraph (d) (11) of 29 CFR 1910.146 and OAR 437-002-0146.
- The plant representative shall debrief the contractor at the conclusion of their confined space entry regarding the plant program and any hazards confronted or created in permit spaces during entry operations.



Records

- After a permit required confined space entry, give cancelled forms to the Safety Manager. Forms will be kept for at least one month from the date it expires.
- There is a special relationship between permits, entry forms, and 1910.1020 “Access to Employee Medical and Exposure Records.” If the permit or form documents exposure to an atmospheric hazard that pushes the employee over the Time Weighted Average threshold for the 40-hour work week, it becomes an exposure record and must be maintained for 30 years.
 - *Time Weighted Average (TWA) Thresholds:*
 - Methane – 1,000+ ppm (2% LEL) over an 8-hour TWA in a 40-hour work week
 - Hydrogen Sulfide – 50+ ppm TWA, but not more than 10-minute duration per exposure
 - Carbon Monoxide – 50+ ppm over an 8-hour TWA in a 40-hour work week
- If an air monitor is used that datalogs, and the monitoring is associated with a specific person, then the logged data can be used as an exposure record. If so, then it must be kept in an accessible form for 30 years.
- Retain training records – this must include training roster with trainer’s wet signature.

Example of Time Weighted Average

METHANE

WW PGM Alarms at 10% LEL which equates to 5,000 ppm

30 year exposure record is required at 1,000+ ppm over an 8-hour TWA in a 40-hour work week.

Methane LEL %	PPM	Minutes	PPMxMinutes
10%	5000	5	25000
15%	7500	10	75000
50%	25000	30	750000
100%	50000	30	1500000
SUM of Exposure Minutess		75	
Subtract SUM from 2400			
minutes to get leftover 40			
hours	0	2325	0
Weekly TOTALS		2400	2350000
		TWA	979

Example of Time Weighted Average

HYDROGEN SULFIDE

100'

WW PGM Alarms at 10 ppm

30 year exposure record is required for 50+ ppm over an 8-hour TWA in a 40-hour work week (but not more than 10 minute duration per exposure).

H2S	PPM	Minutes	PPMxMinutes
	10	120	1200
	20	60	1200
	50	20	1000
	300	9	2700
SUM of Exposure Minutes		209	
Subtract SUM from 2400			
minutes to get leftover 40			
hours		2191	
Weekly TOTALS		2400	6100
		TWA	2.54

< At 10 minutes this would become an exposure record

Training Requirements: Train employees involved in permit space activities, so they have the understanding, knowledge, and skills necessary to safely perform their duties.

- For all **new** employees
- Before an employee is assigned permit-space duties
- Before there is a **change** in an employee's assigned **duties**
- When there is a hazard for which an employee has not been trained
- When there are changes to the confined space entry program
- When the permit audit shows **deficiencies**
- When there is a deviation from established procedures or an employee's knowledge of the procedures is inadequate
- Repeat training when there is a change in the written program and when there are new or previously unidentified permit spaces.
- Awareness training is required for employees who work or may work in areas where permit spaces are present.

Module 4: Progress Check

1) What are examples of confined spaces located at Wastewater?

Wet Wells, Vaults, Tanks, Grit Channels

2) When is an Entry Plan needed?

When a single valve is the only control holding back an engulfment hazard from a confined space where staff will be entering

3) True or False – In order to meet Alternate Entry conditions, all hazards must be eliminated or controlled. **True**

4) If an air monitor alarms while entrants are in the confined space, do they need a new Alternate Entry Form prior to re-entry?? **Yes**

Module 4: Progress Check

5) Why must you always test the air at various depths of the confined space?

Because gases have different densities and can sit at various levels in the space.

6) When should you inspect your harness? **Before each use**

7) Who is approved to perform entry rescue at Wastewater? **No one**

The most important thing to remember....
ask questions when you are unsure or
notice any red flags. Do not put your life
on the line to get work done faster or to
avoid awkward interactions. The safety of
Wastewater staff is our top priority!



QUESTIONS?

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