MSW Initial/Refresher Training:

Confined Space Entry and Gas Detection

Learning Objectives

At the end of this module, you will be able to:

- Define the classifications of confined spaces
  - Downgraded Confined Space vs. Confined Spaces with Special Hazardous Characteristics
- Use Start Work Check
  - Explain gas testing requirements prior to entry
  - Understand Entry Watch responsibilities
  - Assist in preparing quality rescue plans

  - **Always** consider alternatives before performing confined space entry

Please see MSW Confined Space Entry Standard

Confined Space Entry Definitions

- **Confined Spaces**

Spaces large enough and so configured that a worker can bodily enter and perform assigned work; **and**

  - Have limited or restricted means for entry or exit (e.g. tanks, vessels, furnaces, pipelines, storage bins, hoppers, vaults, sumps, pits and excavations); **and**
  - Are not designed for continuous worker occupancy.

Confined Space Entry Definitions

Confined Space Entry with Special Hazardous Characteristics:

A space that meets all the criteria of a confined **space and one or more** of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere.
   - *Potential Hazardous Atmosphere - An atmosphere where any toxic concentration is greater than or equal to 50% of the Occupational Exposure Limit (OEL) or 5% of the LEL.*
2. Contains a material that has the potential to engulf an entrant.
3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross sections.
4. Contains any other recognized serious potential safety or health hazard.

Confined Space Entry Requirements

- **All Confined Space Entry must have:**
  - PTW and Confined Space Permit
  - Dedicated Entry Watch responsible for only one confined space w/ Entry Log
  - Documented Rescue Plan
  - **Confined Space Entry with Special Hazardous Characteristics must have**:
  - PPHA
  - Rescue equipment
  - Non-entry rescue methods
  - Dedicated entry watch and entry supervisor
    - The Entry Supervisor is not limited to one space
- **Downgraded Confined Spaces:**
  - Downgraded confined spaces do not require the entry supervisor or non-entry retrieval systems.
  - Documentation of the downgrade (date & authorization signature) must be maintained at the worksite and attached to the permits

Documenting the Confined Space Classification and Requirements

- Use the Confined Space Permit as a tool!

Confined Space Entry ☐ N/A

Entry Requirements	O_2	LEL	H_2S	CO	Benzene
Potential hazardous atmosphere	NA	≥ 5%	≥ 2.5 ppm	≥ 25 ppm	≥ 0.5 ppm
On-site rescue required	NA	NA	≥ 50 ppm	≥ 600 ppm	≥ 250 ppm
No Entry without Chevron management approval	< 19.5% or > 23.5%	≥ 10%	NA	NA	NA

Confined Space Classification Checklist

	Initial	Re-evaluate
The space is free of a potentially hazardous atmosphere, and the work performed in the space will not create one	☐ Yes ☐ No	☐ Yes ☐ No
The space is free of recognized serious potential safety and health hazards	☐ Yes ☐ No	☐ Yes ☐ No
The space is free of inward sloping or converging walls that could trap an entrant	☐ Yes ☐ No	☐ Yes ☐ No
The space is free of engulfment hazards	☐ Yes ☐ No	☐ Yes ☐ No

If all the above are "YES" the space can be downgraded as long as conditions do not change.

☐ **Downgraded Confined Space**
Downgraded confined spaces do not require the entry supervisor or non-entry retrieval systems.

☐ **Confined Space with Special Hazardous Characteristics**
Non-entry rescue methods shall be used unless the retrieval equipment would introduce hazards or would not contribute to the rescue of the entrant.
Requires continuous gas monitoring

General Requirements

☐ Positive Physical Isolation in place (blinds, misalignment, remove spool)
☐ "DANGER Confined Space Entry" sign posted at opening of space
☐ Documented rescue plan is in place (required for all confined space entry)
☐ Communication method established between entry watch and entrants
☐ Measures in place to prevent unauthorized entry
☐ Potential for heat stress has been evaluated
☐ Confined space visually identifiable (cones, tape, gate, observer, etc.)

Ventilation Type: ☐ Natural ☐ Mechanical - verify safeguards below

☐ Sources of air contaminants positioned away from confined space
☐ Ventilation equipment electrically bonded to the confined space
☐ Intake is from a clean source, not near equipment exhaust
☐ Mechanical ventilation shut down 30 mins before initial gas test

Roles & Responsibilities

Entry Supervisor
Name:

Entry Watch
Name:

If the permit was closed for a reason other than work completion list reason (e.g. Permit condition exceeded) _____ and notify HES

Confined Space Entry Log ☐ Entry Log Attached

Entrant Name	Time In	Time Out	Any Entry Duration Limitations

Confined Space Entry
Start Work Checks

Start-Work Authority: Confirm below are in place and verified prior to starting work

Save Your Life Actions All exposed persons performing work must confirm each action below.	Person(s) Performing Work (initial)	Start-Work Verifier (initial)
Isolation of Hazardous Energy		
I have confirmed:		
1 Confined Space Entry has been evaluated for Isolation of Hazardous Energy (IHE) requirements. Does Confined Space Entry require IHE? ☐ Yes ☐ No **If yes:** Complete **IHE Start-Work Checks**. **If no:** Continue to **Step 2**. ★		
Prior to Confined Space Entry		
I have confirmed:		
2 The atmosphere is within allowed limits for entry. **Oxygen:** between 19.5–23.5% **LEL:** less than 10% **H_2S:** less than 5 ppm **Other gas tested:** _____ ★		
3 Gas testing frequency has been established.		
4 Ventilation is in place and working.		
5 Entry watch has been assigned and communication plan agreed to. ★		
6 All entrants are wearing rescue equipment required in rescue plan. ★		

Stop and seek help if any of the above safeguards are not in place

Confined Space
Start Work Checks – Action 1

Action 1: Confirm that Confined Space Entry (CSE) has been evaluated for Isolation of Hazardous Energy (IHE) requirements.

- Use IHE Start Work Checks in addition to CSE Start Work Checks

What type of isolation is required?

- **Positive Physical Isolation:** An isolation where there is zero potential of an energy release. Equipment is positively separated from the hazardous energy and toxic substance using one of the following methods:
  - Removal of a section (spool) of piping
  - Physical removal of a circuit breaker and grounding the system
  - Removal of mechanical couplings
  - Blinding (examples include blind flange, spade, pancake blind, skillet blind, spectacle blind)
    - *Must be stamped or certified with its rated pressure and designed for maximum design pressure of the equipment*

Confined Space Entry
Start Work Checks – Action 2

Action 2: Confirm that the atmosphere is within allowable limits for entry.

Qualified gas testers (QGT) often can't cite the acceptable atmospheric working conditions.

Where are acceptable atmospheric conditions listed?

- Portable Gas Detection Standard Requirement 5
- *On the permits – use the permit as a tool!*

Other gas testing requirements:

- Verify with QGT that the gas meter is working
- Shut down ventilation a minimum of 30 minutes prior to initial gas test
- Perform initial gas testing outside of the confined space
- After initial test, perform subsequent gas testing inside of the confined space

Confined Space Entry
Start Work Checks – Action 3

Action 3: Confirm that gas testing frequency has been established.

How do you decide gas testing frequency?

- If special hazardous characteristics are present, continuous gas testing is required for entry
  - *Results must be documented at a minimum of every 4 hours…*

- If the space was downgraded, the QGT determines the frequency of tests and documentation based on potential hazards

- Entry must occur no more than 30 minutes after the QGT has cleared the space

Use the permit as a tool!

Confined Space Entry
Document Gas Test Results

MCBU Permit to Work - Gas Testing Log

Meter Inspection & Function Check	Type	Serial Number	Cal Due	Pre-Use Bump	QGT Initials
			days	☐ OK	
			days	☐ OK	

Atmospheric Monitoring ☐ Additional Log Attached

Date	Time	O_2 % 19.5 % -23.5%	LEL (%) < 10 %	H_2S (< 5 ppm)	CO (< 50 ppm)	Other:	Other:	Meter Number	QGT Initials

Follow-Up Gas Testing Requirements

Frequency of Tests	LEL =0% ☐ Gas Tester determines frequency (based on potential hazards, change in conditions, odors)
	LEL >0% and <10% ☐ Continuous monitoring required
Documentation	☐ Initial Only ☐ 15mins ☐ 30mins ☐ 1hr ☐ 2hrs ☐ Other:

Qualified Gas Tester Signatures

Gas Tester:	Name:	Signature:
Gas Tester:	Name:	Signature:

Confined Space Entry
Start Work Checks – Action 4

Action 4: Confirm that ventilation is in place and working.

What type of ventilation can be used for confined space entry?

- Natural &/or mechanical

Ventilation Type: ☐ Natural ☐ Mechanical - verify safeguards below	
☐ Sources of air contaminants positioned away from confined space	☐ Intake is from a clean source, not near equipment exhaust
☐ Ventilation equipment electrically bonded to the confined space	☐ Mechanical ventilation shut down 30 mins before initial gas test

What should be confirmed during planning and immediately before entry?

- Ventilation will dilute the air from containing dust, fumes, mist, vapors, gases, heat, etc.
- Ventilation will be continuous.
- Flexible ducting is arranged so there are no dead spaces when using mechanical ventilation.
- Mechanical ventilation equipment is bonded and/or grounded to prevent static electricity hazards.
- Exhaust outlets are not near an ignition source and will not draw exhausted air back into the space.
- Inlets will not be affected by wind/weather conditions and will not have flow restrictions.

Confined Space Entry
Start Work Checks – Action 5

Action 5: Confirm that entry watch has been assigned and communication plan agreed to.

What are the entry watch responsibilities?

- Understand the planned work and emergency notification procedures
- Control access and egress of personnel into and out of confined spaces
- Maintain a documented log of workers in the confined space
- Monitor workers and conditions inside the confined space
- Maintain communications with workers inside the confined space
- Understand when to stop work
- Remain posted at the confined space entry (*single confined space*) as long as work is being conducted
- May have other job duties as long as they can fulfill all entry watch responsibilities

Confined Space Entry
Start Work Checks – Action 6

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Action 6: Confirm that all entrants are wearing rescue equipment required in rescue plan.

- **A written rescue plan addressing specific hazards or limitations is required for all confined space entries!**
- Confined Spaces with an atmosphere potentially immediately dangerous to life or health require an **ON-SITE** rescue team
- Rescue plan must include, but is not limited to:
  - Location of trained responders (onsite for entries with special hazardous characteristics)
  - Rescue equipment
  - Accessibility to confined space
  - Use of retrieval systems (e.g., chest/full-body harness with retrieval line) to eliminate the need for entry-required rescue (Confined space with special hazardous characteristics)

Emergency service workers perform a practice rescue inside a manhole.
Photo: Oregon OSHA

Confined Space Entry
Rescue

Potential Immediately Dangerous to Life or Health (IDLH) Atmosphere *-An atmosphere where any toxic concentration is greater than or equal to 50% of the IDLH level.*

Confined Space Entry					☐ N/A
Entry Requirements	**O_2**	**LEL**	**H_2S**	**CO**	**Benzene**
Potential hazardous atmosphere	NA	≥ 5%	≥ 2.5 ppm	≥ 25 ppm	≥ 0.5 ppm
On-site rescue required	NA	NA	≥ 50 ppm	≥ 600 ppm	≥ 250 ppm
No Entry without Chevron management approval	≤ 19.5% or ≥ 23.5%	≥ 10%	NA	NA	NA

Rescue Safeguard	Confined Space Classification
Rescue Plan	All Confined Spaces
Non-Entry Rescue*	Confined Space with Special Hazardous Characteristics
On-site Rescue	Potential IDLH Atmosphere

*Unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Entry rescue is acceptable in this scenario but is not required to be onsite.

What scenarios may not facilitate non-entry rescue?

– Entanglement issues, Entrant travels around corners or moves between levels, etc.

Confined Space Entry
Rescue Questions

General questions:

- Is the rescue plan at the job site?
- Has the rescue plan been shared with the crew?
- Is the crew wearing rescue equipment as described in the rescue plan?

Questions for on-site rescue team:

- Are rescue personnel trained and competent and have the ability to perform their responsibilities?
- Does the rescue team have the correct rescue equipment?

Questions for off-site rescue team:

- How quickly can the rescue team respond?
- Is the rescue team or service available at all times of the day and in all situations?
- Is an adequate method of communication between the work site and prospective rescuer available?

Merely posting an offsite rescue service's phone number or planning to rely on an emergency phone number for emergency response is not sufficient.

Confined Space Entry
CSE Matrix

Permitting, Planning, Assessment				Rescue		Atmospheric Conditions & Limits					Role Requirements	
						Confined Space Permit Limits						
Confined Space Classification	**PPHA**	**JSA**	**PTW / CSE**	**Minimum Rescue type**	**Documented Rescue Plan**	**$\%O_2$** 19.5% - 23.5%	**%LEL** <10%	**H_2S** OEL – 5ppm IDLH – 100ppm	**CO** OEL – 25ppm IDLH – 1200ppm	**Benzene** OEL – 1ppm IDLH – 500ppm	**Entry Supervisor**	**Entry Watch & Entry Log**
Downgraded Confined Space	No	Yes	Yes	Designated rescue	Plan addressing unique configuration or limitations	19.5%-23.5%	< 5%	< 2.5ppm	< 25 ppm	< 0.5 ppm	No	Yes
Potential Hazardous Atmospheric Conditions (≥ 50% OEL or 5% LEL)	Yes	Yes	Yes	Designated rescue	Rescue addresses potential atmospheric conditions[1]	NA	≥ 5%	≥ 2.5 ppm	≥25 ppm	≥ 0.5 ppm	Yes	Yes
Special Hazardous Characteristic (Physical /non-atmospheric)	Yes	Yes	Yes	Designated rescue	Rescue addresses physical hazards[1]	NA	NA	NA	NA	NA	Yes	Yes
Potential IDLH Atmosphere Conditions (≥ 50 % IDLH)	Yes	Yes	Yes	Dedicated on-site	Feasible rescue plan to remove incapacitated or impaired entrant(s)[1]	NA	NA	≥ 50ppm	≥ 600ppm	≥ 250ppm	Yes	Yes
No Entry[2]						<19.5% Or >23.5%	> 10%					

Footnotes
OEL = Occupational Exposure Limit (OSHA or Chevron)
IDLH = Immediately dangerous to life or health
[1] = Non-entry rescue retrieval systems or methods shall be used whenever an authorized entrant enters a space with special hazardous characteristics, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.
[2] = No Entry Allowed without higher level Chevron Manager approval (Operations Superintendent Drilling Superintendent or Equivalent)

Confined Space Entry Permit

Confined Space Entry					☐ N/A
Entry Requirements	**O_2**	**LEL**	**H_2S**	**CO**	**Benzene**
Potential hazardous atmosphere	NA	≥ 5%	≥ 2.5 ppm	≥ 25 ppm	≥ 0.5 ppm
On-site rescue required	NA	NA	≥ 50 ppm	≥ 600 ppm	≥ 250 ppm
No Entry without Chevron management approval	≤ 19.5% or ≥ 23.5%	≥ 10%	NA	NA	NA

Confined Space Classification Checklist	Initial	Re-evaluate
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The space is free of recognized serious potential safety and health hazards	☐ Yes ☐ No	☐ Yes ☐ No
The space is free of inward sloping or converging walls that could trap an entrant	☐ Yes ☐ No	☐ Yes ☐ No
The space is free of engulfment hazards	☐ Yes ☐ No	☐ Yes ☐ No

If all the above are "YES" the space can be downgraded as long as conditions do not change.

☐ **Downgraded Confined Space**	☐ **Confined Space with Special Hazardous Characteristics**
Downgraded confined spaces do not require the entry supervisor or non-entry retrieval systems.	Non-entry rescue methods shall be used unless the retrieval equipment would introduce hazards or would not contribute to the rescue of the entrant. **Requires continuous gas monitoring**

General Requirements

☐ Positive Physical Isolation in place (blinds, misalignment, remove spool)	☐ Measures in place to prevent unauthorized entry
☐ "DANGER Confined Space Entry" sign posted at opening of space	☐ Potential for heat stress has been evaluated
☐ Documented rescue plan is in place (required for all confined space entry)	☐ Confined space visually identifiable (cones, tape, gate, observer, etc.)
☐ Communication method established between entry watch and entrants	

Ventilation Type: ☐ Natural ☐ Mechanical - verify safeguards below

☐ Sources of air contaminants positioned away from confined space	☐ Intake is from a clean source, not near equipment exhaust
☐ Ventilation equipment electrically bonded to the confined space	☐ Mechanical ventilation shut down 30 mins before initial gas test

Roles & Responsibilities

Entry Supervisor Name:	Entry Watch Name:

If the permit was closed for a reason other than work completion list reason (e.g. Permit condition exceeded) _____ and notify HES

Confined Space Entry Log			☐ Entry Log Attached
Entrant Name	**Time in**	**Time Out**	**Any Entry Duration Limitations**

Use Confined Space Entry specialized permit section for:

- Entry Requirements
- Classification Checklist
- General Requirements
- Ventilation Type
- Roles & Responsibilities
- Entry Log

Use Centralized sections of Permit to Work for:

- Gas test log
- Approval
- Revalidation
- Closeout

MCBU Permit to Work - Gas Testing Log									
Meter Inspection & Function Check	Type		Serial Number		Cal Due		Pre-Use Bump		QGT Initials
					days		☐ OK		
					days		☐ OK		
Atmospheric Monitoring								☐ Additional Log Attached	
Date	**Time**	**O_2 % 19.5 % -23.5%**	**LEL (%) < 10 %**	**H_2S (< 5 ppm)**	**CO (< 50 ppm)**	**Other:**	**Other:**	**Meter Number**	**QGT Initials**
Follow-Up Gas Testing Requirements									
Frequency of Tests	LEL =0% ☐ Gas Tester determines frequency (based on potential hazards, change in conditions, odors)								
	LEL >0% and <10% ☐ Continuous monitoring required								
Documentation	☐ Initial Only ☐ 15mins ☐ 30mins ☐ 1hr ☐ 2hrs ☐Other:								
Qualified Gas Tester Signatures									
Gas Tester:	Name:			Signature:					
Gas Tester:	Name:			Signature:					

Confined Space Entry
FAQs

- Am I allowed to enter the confined space to complete the initial gas testing?

  If the space can not tested and classified from out side of the space a PTW, CSE permit, On-site rescue and supplied air shall be used to enter an unknown atmosphere for initial gas testing

- Is the Entry Watch required to maintain the entry log if the space has been downgraded?

  Yes, one of the duties of the Entry Watch is to maintain a documented log of workers in the confined space. This requirement applies regardless of whether the space has been downgraded.

Confined Space Entry
FAQs – Breaking the Plane

- Is breaking the plane of any opening considered a confined space entry?

  No – only if you can fully bodily enter the space.
  [MSW Process definition for Confined Space Entry: The act of passing any part of a worker's body through the opening into a confined space large enough to allow full entry. Entry is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into that space.]

- What is considered "on-site" rescue? Is there guidance for how long it should take an on-site rescue to "timely" complete rescue?

  What will be considered timely will vary according to the specific hazards involved in each entry. For example, §1910.134, Respiratory Protection, requires that employers provide a standby person or persons capable of immediate action to rescue employee(s) wearing respiratory protection while in work areas defined as IDLH atmospheres.

Confined Space Entry
Save Your Life Actions

Start-Work Authority: Confirm below are in place and verified prior to starting work

Save Your Life Actions All exposed persons performing work must confirm each action below.	Person(s) Performing Work (initial)	Start-Work Verifier (initial)
Isolation of Hazardous Energy		
I have confirmed:		
1 Confined Space Entry has been evaluated for Isolation of Hazardous Energy (IHE) requirements. Does Confined Space Entry require IHE? ☐ Yes ☐ No **If yes:** Complete **IHE Start-Work Checks**. **If no:** Continue to **Step 2**.		
Prior to Confined Space Entry		
I have confirmed:		
2 The atmosphere is within allowed limits for entry. **Oxygen:** between 19.5–23.5% **LEL:** less than 10% **H_2S:** less than 5 ppm **Other gas tested:** _____		
3 Gas testing frequency has been established.		
4 Ventilation is in place and working.		
5 Entry watch has been assigned and communication plan agreed to.		
6 All entrants are wearing rescue equipment required in rescue plan.		

Stop and seek help if any of the above safeguards are not in place