

# Confined Space Entry



# Confined Space

## Self-Study Course & Exam

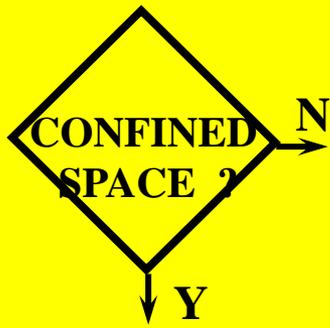


To Receive Credit For This Course  
Contact The Safety Office For A Test  
Or Print A Copy From On-Line  
Passing Grade is **70%** Or Better

Note: Many Exam Questions Can Be Found In This Presentation But Not All. You Will Also Need To Refer To The **Confined Space Entry Policy And Program** And Other Confined Space Information Found On Safety's Webpage.

# Confined Space

In Accordance With  **29 CFR 1910.146**



The **Division of General Services** Has

- Evaluated The Workplace And Has Identified And Posted Confined Space Locations To Include Permit Required Confined Spaces

(see [http://www.gs.sc.gov/webfiles/g\\_s\\_0/policy/Confined\\_Spaces\\_A-E\\_4-18-2013.pdf](http://www.gs.sc.gov/webfiles/g_s_0/policy/Confined_Spaces_A-E_4-18-2013.pdf) and [http://www.gs.sc.gov/webfiles/g\\_s\\_0/policy/Confined\\_Spaces\\_F-Z\\_14-18-2013.pdf](http://www.gs.sc.gov/webfiles/g_s_0/policy/Confined_Spaces_F-Z_14-18-2013.pdf) )

- A Written Confined Space Entry Program

(see [http://www.gs.sc.gov/webfiles/g\\_s\\_0/policy/CSE\\_Pgm-Rev-Oct10.pdf](http://www.gs.sc.gov/webfiles/g_s_0/policy/CSE_Pgm-Rev-Oct10.pdf) )

- Training (Annually)

- This Self-Study & Test
- Hands-On Class



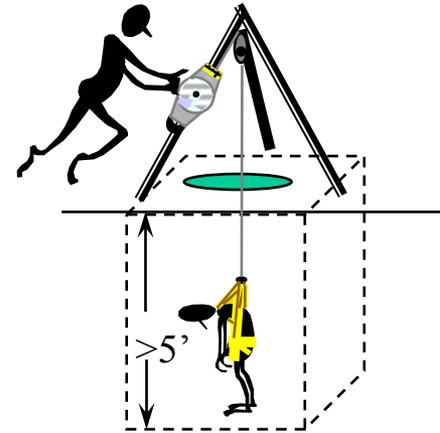
# Confined Space

## Examples

- Boilers
- Chases
- Cooling Towers
- Elevator Pits
- Manholes
- Pipelines
- Sewers
- Sump Pump Pits
- Tanks
- Utility Tunnels

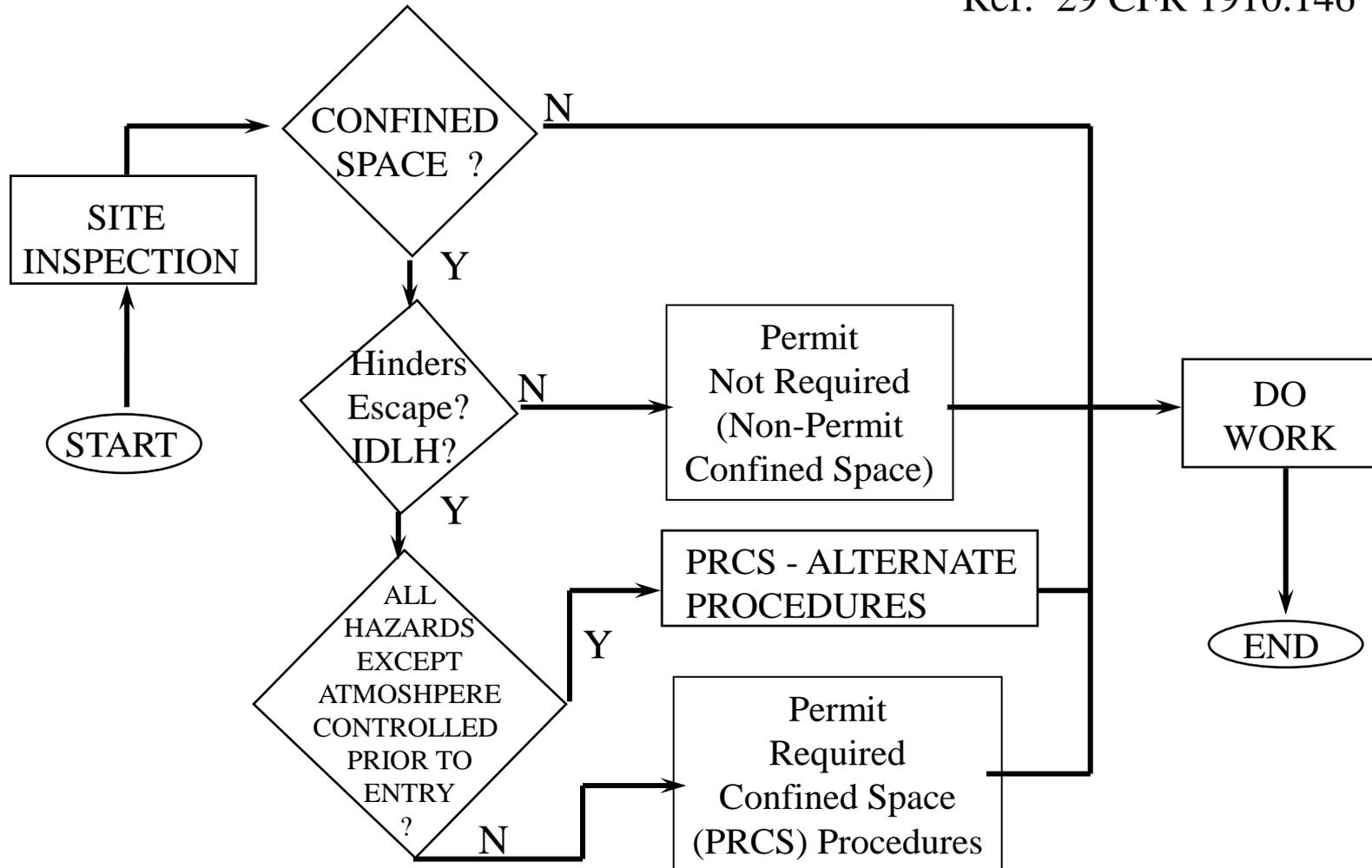


# How to Determine What Is A *CONFINED SPACE* & Which Procedures to Use



# Confined Space Decision Flowchart

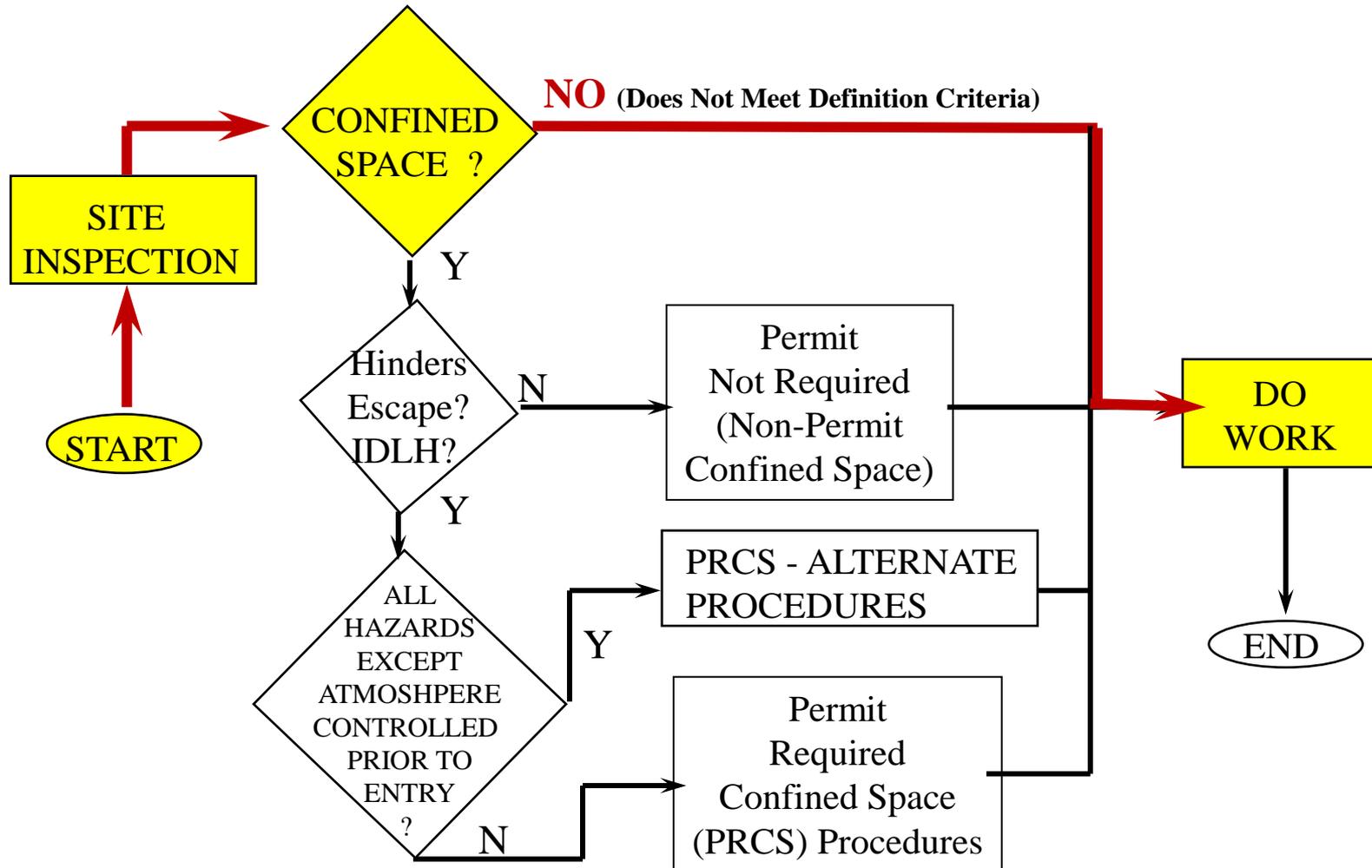
Ref: 29 CFR 1910.146

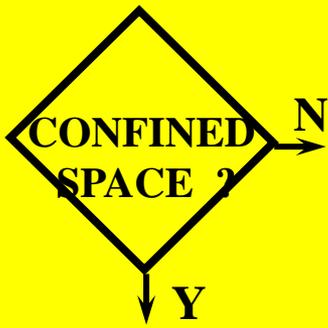


# Confined Space

## Decision Flowchart

Space Is **Not** A Confined Space





# Confined Space Definition

Any Space Large Enough to Enter and Work That:

- Has Restricted Entry and Exit
- Not Intended for Continuous Occupancy

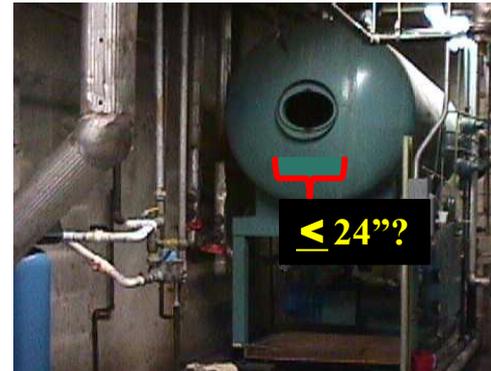


# Confined Space

## Restricted Access

Any Permanent / Temporary Structure Or Barrier That Obstructs, Impedes Or Hinders Access To, Or Egress Or Rescue From The Confined Space.

Examples - The Entry Portal:



**Size** –Dimension Is 24” Or Less

- Prevents EMS Rescuers From Entering With SCBA

# Confined Space

## Restricted Access (cont.)

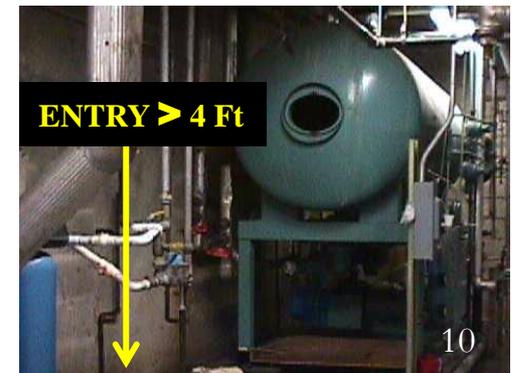
Any Permanent / Temporary Structure Or Barrier That Obstructs, Impedes Or Hinders Access To, Or Egress Or Rescue From The Confined Space.

Examples - The Entry Portal:



### Location:

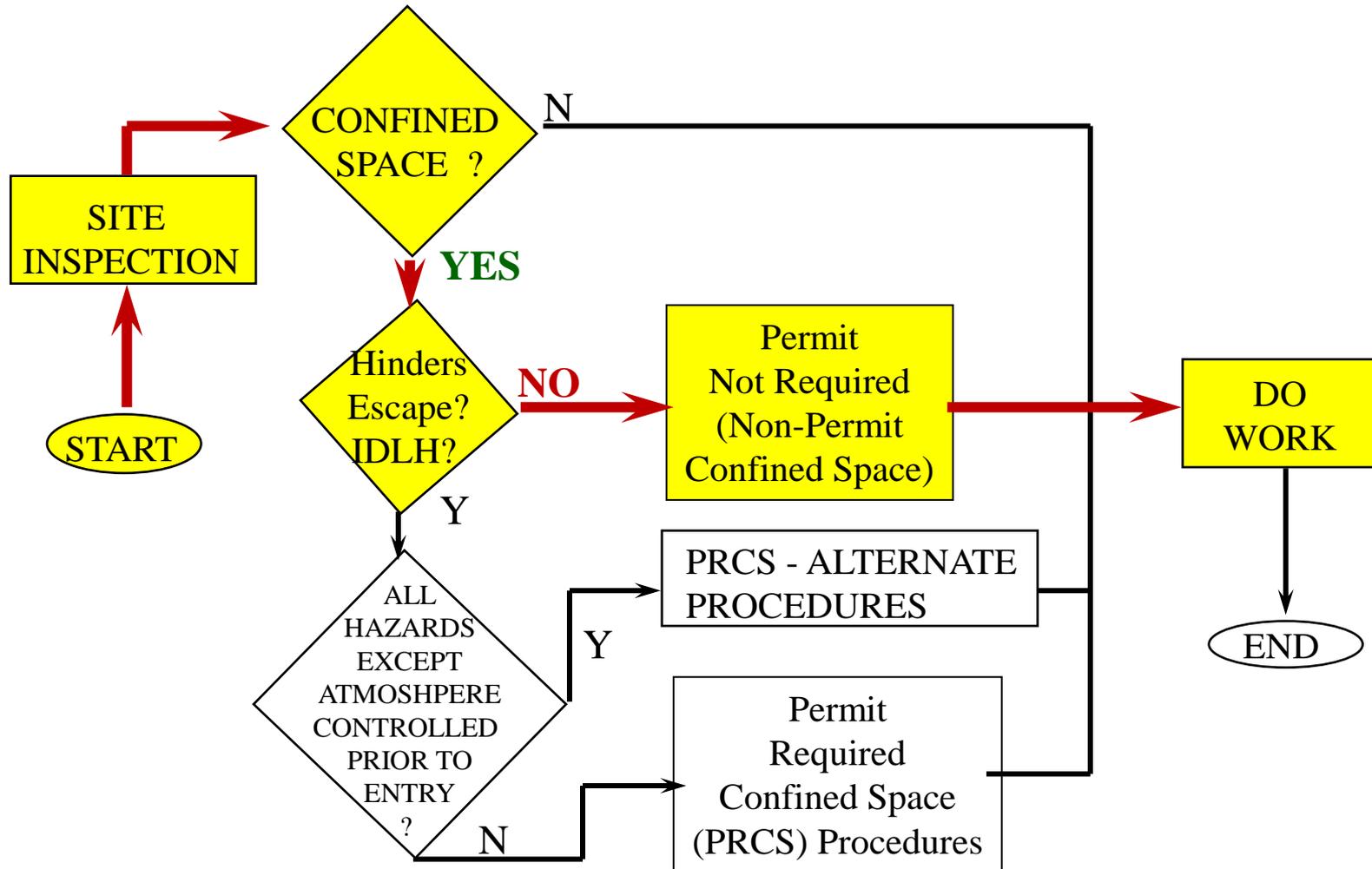
- Elevation – Opening To The Space Is 4' Or More Above Grade
- On Side – Horizontal Access Makes Use Of Retrieval Lines Difficult
- On Top / Bottom – Rescuers Have To Climb Up / Down; May Require
  - Rope Rescue & Special Patient Packaging
- Excessive Distance / Time To Evacuate



# Confined Space

## Decision Flowchart

Space **Is A Confined Space** (Permit Not Required)



# Confined Space Definition

## Immediately Dangerous To Life Or Health (IDLH)

Entrant Could Be Incapacitated or Disabled by an Actual *or Potential* IDLH Condition:

- Hazardous Atmosphere
- Entrapment
- Engulfment
- Serious Safety or Health Hazard



# Confined Space Definition

“**Entry**” Occurs As Soon As  
*Any Part* Of The Entrant’s Body  
Breaks The Plane Of The  
Opening Into The Space,  
Including Any Extremities  
(Hands Or Feet).



# Confined Space

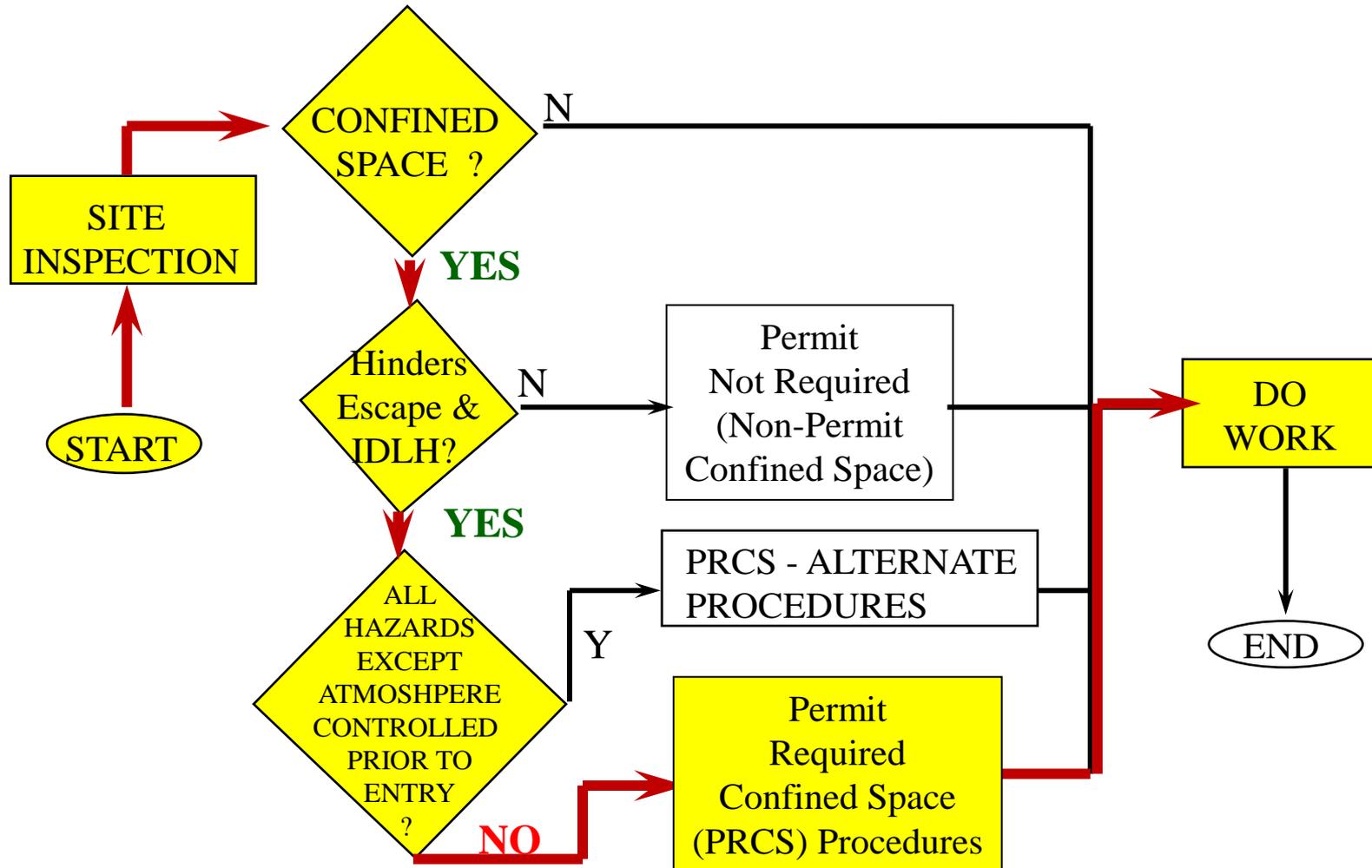
## Before Entering

- **Required To Test Internal Atmosphere**  
(In This Order):
  - Oxygen Content
  - Flammable Gases And Vapors
  - Potential Toxic Air Contaminants
- Use A Calibrated Direct-Reading Instrument
- Entrant Should Observe / Perform Pre-Entry Testing



# Confined Space Decision Flowchart

Space **Is A Confined Space (Permit Required)**



# Confined Space

## Entry Permit

### Plan & Authorization For Entry

- Supervisor Designates Entry Team
  - Entrants
  - Attendants
  - Supervisor
- Training Certifications Current
- Job Specific
  - Purpose / Scope Of Work
  - Location
  - Date, Time & Duration (Job Specific)
  - Hazards & Controls Identified
  - Equipment & PPE Needed
- Emergency Procedures
  - Communications / 9-1-1
  - Rescue Equipment On & Off Site
- Supervisor Signs & Executes

**admin**  
THE SOUTH CAROLINA  
DEPARTMENT of ADMINISTRATION

**SAFETY PROGRAM:**

**CONFINED SPACE ENTRY PERMIT**  
THIS PERMIT IS TO BE KEPT AT THE JOB SITE  
UNTIL THE JOB IS COMPLETED  
Copy kept by Entry Supervisor

**DURATION:** This permit is valid only for the specified job as follows:

START DATE: \_\_\_\_\_ TIME: \_\_\_\_\_  
EXPIRES ON - DATE: \_\_\_\_\_ TIME: \_\_\_\_\_

**SITE LOCATION:** \_\_\_\_\_  
(Building Name, Number, Street Address, Room Number, etc.)

**PURPOSE OF ENTRY:** \_\_\_\_\_  
(Equipment to be Worked On and Type of Work)

**1. INITIAL ATMOSPHERIC CHECK:**

CO \_\_\_\_\_ ppm    H<sub>2</sub>S \_\_\_\_\_ ppm    Instrument Used - Industrial Scientific M-40 \_\_\_\_\_  
O<sub>2</sub> \_\_\_\_\_ %    LFL \_\_\_\_\_ %    Other - \_\_\_\_\_

Acceptable Levels for Entry:    19.5% < O<sub>2</sub> < 23.5%    CO < 50 ppm  
LFL < 10 %    H<sub>2</sub>S < 10 ppm

Tester's Signature \_\_\_\_\_ Date/Time \_\_\_\_\_

**2. HAZARD ISOLATION, i.e., Lines Blinded, Disconnected or Blocked.** The following measures are to be used to eliminate/control hazards in the confined space:

HAZARD	CONTROL	COMPLETED
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

**3. VENTILATION:**

Mechanical \_\_\_\_\_ Purge Time \_\_\_\_\_ Completed \_\_\_\_\_  
Natural \_\_\_\_\_

Questions? Remco, Inc. Safety, 774-2315    Page 1 of 4    As of 10/29/2015

# Confined Space

## Definition



## Permit-Required Confined Space

A Confined Space That Has One Or More Of The Following Hazardous Characteristics:

- **Hazardous Atmosphere**
- Contains A Material That Could **Engulf** Someone
- **Entrapment** Due To Sloping Walls Or Floors
- Other Recognized Serious Safety Or Health Hazard
  - **IDLH**: Conditions That Are Immediately Dangerous To Life And Health

# Confined Space Hazard Abatement

Each Confined Space Was Surveyed And Documented With:

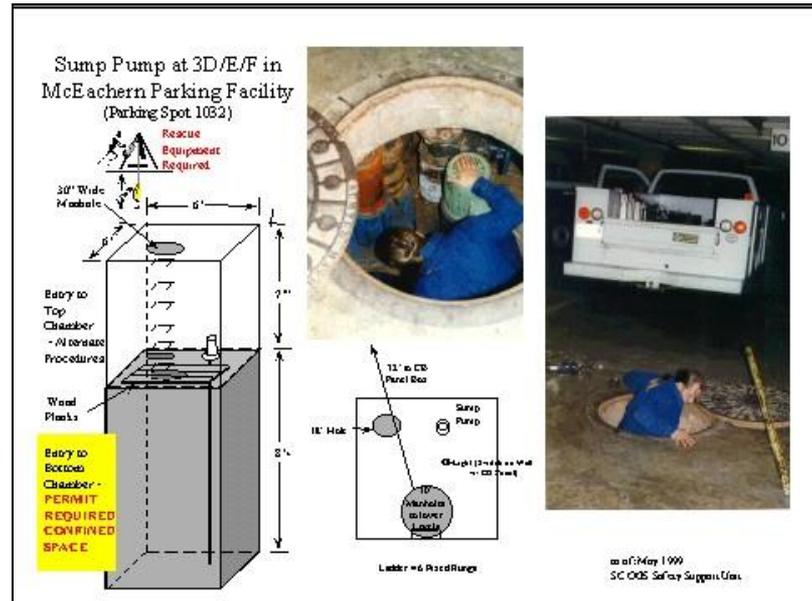
- A Diagram
- Photos

Available On The Safety Webpage (See “Confined Spaces” Under “Policies & Programs”)

[http://www.gs.sc.gov/webfiles/gs\\_0/policy/Confined\\_Spaces\\_A-E\\_4-18-2013.pdf](http://www.gs.sc.gov/webfiles/gs_0/policy/Confined_Spaces_A-E_4-18-2013.pdf)

[http://www.gs.sc.gov/webfiles/gs\\_0/policy/Confined\\_Spaces\\_F-Z\\_14-18-2013.pdf](http://www.gs.sc.gov/webfiles/gs_0/policy/Confined_Spaces_F-Z_14-18-2013.pdf)

Note: The Supervisor Should  
Use This Visual Information  
To Brief The Entry Team



# Confined Space Hazard Abatement

Each Confined Space Was Surveyed Using *Job Safety Analysis*

- **Basic Work Steps Were Identified**

**CONFINED SPACES SURVEY  
Job Safety Analysis Worksheet**

Title of Job/Operation: Air Return Duct Repair Date: 10/4/06 No.           
 Position/Title(s) of Person(s) Who Do Job:          Name of Employee Observed:           
 Analysis Made By: Bruce Lee  
 Department: Building Systems  
 Section: Facilities Management Analysis Approved by: Confined Space Coordinator

Sequence of Basic Job Steps	Potential Accidents or Hazards	Recommended Safe Job Procedures
1. Prepare to Enter	SB- Vehicle traffic	Control off/Makehole with discolors
	OE- Loose Manhole cover	-JD Use... use level/proper lifting technique
2. Enter manhole	FB- 7'	Fixed ladders installed, use proper climbing
	E- Gas/Lack of O <sub>2</sub>	Take air samples prior to entry
3. Conduct Work	E- Gas/Lack of O <sub>2</sub>	Take continuous air samples during entry
	CB- Flood waters	Enter properly use exit handle not use
	CW- Electrical	Use LOTO (CB lock or tag) prior to entry
	FS- Slip/Trip (water, paper, equipment)	Wear work boots & be aware of equipment
	SA- Trip/Equipment	Be aware of location
4. Exit	FB	Fixed ladders installed, use proper climbing
5. Close Up	FB/SB	Close cover, keep feet/hands away
	OE- Loose pipe cover(s)	-JD Use... use level/proper lifting technique

Struck By (SB)                      Caught On (CO)                      Fall to Below (FB)  
 Struck Against (SA)                Caught In (CI)                        Overexposed (OE)  
 Contacted By (CB)                  Caught Between (CBT)               Exposure (E)  
 Contact With (CW)                  Fall to Same Level (FS)

# Confined Space Hazard Abatement

Each Confined Space Was Surveyed Using *Job Safety Analysis*

- Basic Work Steps Were Identified
- **The Hazards For Each Work Step Were Identified**

**CONFINED SPACES SURVEY**  
**Job Safety Analysis Worksheet**

Title of Job/Operation at Factory Shop Room 3DR/F Date 10/14/06 No.         
 Position/Title(s) of Person(s) Who Do Job        Name of Employee Observed         
 Analysis Made By Bernie Lee  
 Department Building Systems  
 Section Facilities Management Analysis Approved by Confined Space Committee

Sequence of Basic Job Steps	Potential Accidents or Hazards	Recommended Safe Job Procedures
1. Prepare to Enter	SB- Vehicle traffic	Control off/Make sure no vehicles
	CB- Lifting/Make hole cover	<3D Use, use 1 over/proper lifting technique
2. Enter/Make hole	FB- ?	Fixed ladder, establish, use proper climbing
	E- Gases/Lack of O <sub>2</sub>	Take air samples prior to entry
3. Conduct Work	E- Gases/Lack of O <sub>2</sub>	Take continuous air samples during entry
	CB- Flood waters	Ent. from up one not handle vol use
	CM- Electrical	Use LOTO (CB box or tag) prior to entry
	FS- Slip/Trip (water, pipes, equipment)	Wear work boots & be aware of equipment
	SA- In proper equipment	Be aware of location
4. Exit/eg	FB	Fixed ladder, establish, use proper climbing
5. Close Up	FB/SB	Close cover, keep feet/hands away
	CB- Lifting pt cover(s)	<3D Use, use 1 over/proper lifting technique

Struck By (SB)                      Caught On (CO)                      Fall to Below (FB)  
 Struck Against (SA)                Caught In (CI)                      Overexposed (OE)  
 Contacted By (CB)                    Caught Between (CBT)              Exposure (E)  
 Contact With (CW)                    Fall to Same Level (FS)

# Confined Space Hazard Abatement

Each Confined Space Was Surveyed Using *Job Safety Analysis*

- Basic Work Steps Were Identified
- The Hazards For Each Work Step Were Identified
- **Then Measures Were Identified To Eliminate or Control Hazards**

**CONFINED SPACES SURVEY  
Job Safety Analysis Worksheet**

Title of Job/Operation Installation Jump Box 10/8/11 Date 10/14/09 No. \_\_\_\_\_  
 Position/Title(s) of Person(s) Who Do Job \_\_\_\_\_ Name of Employee Observed \_\_\_\_\_  
 Department Building Systems Analysis Made By Bruce Lee  
 Section Facilities Management Analysis Approved by Confined Space Committee

Sequence of Basic Job Steps	Potential Accidents or Hazards	Recommended Safe Job Procedures
1. Prepare to Enter	SB- Vehicular traffic	Cordon off/Mark with visible cones
	CB- Lifting Markole cover	<30 lbs., use 1 over/1 paper lifting technique
2. Enter manhole	FB- 7'	Fit red ladder, installed, use proper climbing
	E- Gases/Lack of O <sub>2</sub>	Take air samples prior to entry
3. Conduct Work	E- Gases/Lack of O <sub>2</sub>	Take continuous air samples during entry
	CB- Flood water	Ent. fitting one exit handle visible
	CE- Electrical	Use LOTO (CB) before work
	FS- Trip/Trip (wires, pipes, equipment)	Wear work boots & be aware of equipment
	SA- Inadequate lighting	Be aware of location
4. Exit	FB	Fit red ladder, installed, use proper climbing
5. Close Up	FB/SB	Close cover, keep feet/hands away
	CB- Lifting pit cover(s)	<30 lbs., use 1 over/1 paper lifting technique

Struck By (SB)                      Caught On (CO)                      Fall to Below (FB)  
 Struck Against (SA)                Caught In (CI)                      Overexposed (OE)  
 Contacted By (CB)                Caught Between (CBT)              Exposure (E)  
 Contact With (CW)                Fall to Same Level (FS)

# Confined Space Hazard Abatement



The Confined Space Entry Permit Has A Location For:

- The Supervisor To Inform Employees Of Any Known Hazard And How to Eliminate Or Control Those Hazards Before & During Entry
- The Entry Team To Document That Those Controls Have Been Accomplished Prior To And Maintained During Entry

**CONFINED SPACE ENTRY PERMIT**

1. **INITIAL ATMOSPHERIC CHECK:** Instrument Used - TMX410 \_\_\_\_

CO \_\_\_\_ ppm      H<sub>2</sub>S \_\_\_\_ ppm      Other \_\_\_\_  
O<sub>2</sub> \_\_\_\_ %      LFL \_\_\_\_ %

Acceptable Levels for Entry:  
19.5% < O<sub>2</sub> < 23.5%      CO < 50 ppm  
LFL < 10 %      H<sub>2</sub>S < 10 ppm

Tester's Signature \_\_\_\_\_ Date/Time \_\_\_\_\_

2. **HAZARD ISOLATION, i.e., Lines Blinded, Disconnected or Blocked** The following measures are to be used to eliminate/control hazards in the confined space:

<u>HAZARD</u>	<u>CONTROL</u>	<u>COMPLETE</u>

# Confined Space Definition



## Hazardous Atmosphere

- **Flammable** Gas, Vapor, Or Mist In Excess Of 10% Of Its Lower Flammability Limit (LFL)
- Airborne **Combustible Dust** Concentration At LFL Or Above
- **Oxygen Level** – Concentration Too High or Low
- **PEL**: Atmospheric Concentration Above Permissible Exposure Limit
- Other IDLH Atmospheric Condition



# Confined Space Atmospheric Check



The Confined Space Entry Permit Has Locations For The Attendant To Document The Taking Of Air Samples Before & Periodically During Entry



**CONFINED SPACE ENTRY PERMIT**

**1. INITIAL ATMOSPHERIC CHECK:** Instrument Used - TMX410 \_\_\_\_

CO \_\_\_\_ ppm      H<sub>2</sub>S \_\_\_\_ ppm      Other \_\_\_\_  
 O<sub>2</sub> \_\_\_\_ %      LFL \_\_\_\_ %

Acceptable Levels for Entry:  
 19.5% < O<sub>2</sub> < 23.5%      CO < 50 ppm  
 LFL < 10 %      H<sub>2</sub>S < 10 ppm

Tester's Signature \_\_\_\_\_ Date/Time \_\_\_\_\_

**2. HAZARD ISOLATION**, i.e., Lines Blinded, Disconnected or Blocked The following measures are to be used to eliminate/control hazards in the confined space:

**3. VENTILATION:**

Mechanical	Yes ____	Purge Time ____	N/A ____
Natural	Yes ____		N/A ____

**4. ATMOSPHERIC CHECK AFTER ISOLATION & VENTILATION:**

CO \_\_\_\_ ppm      H<sub>2</sub>S \_\_\_\_ ppm      Instrument Used - TMX410 \_\_\_\_  
 O<sub>2</sub> \_\_\_\_ %      LFL \_\_\_\_ %      Other \_\_\_\_

Tester's Signature \_\_\_\_\_ Date/Time \_\_\_\_\_

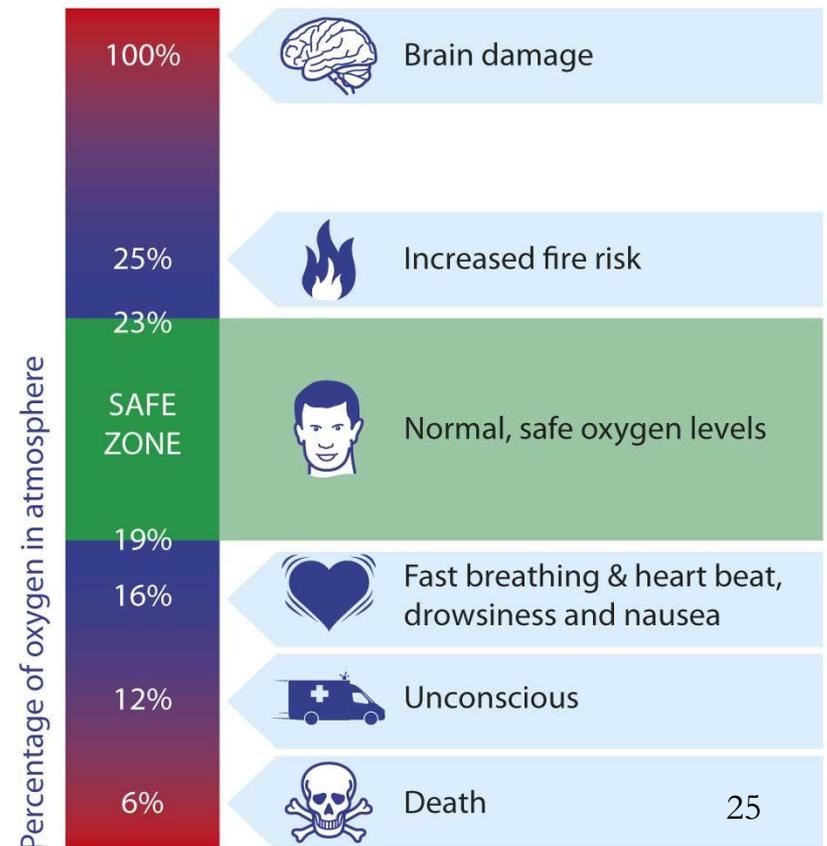
# Confined Space Monitor Atmosphere



**Gas Monitor** Used Prior To And During Confined Space Entry To Monitor:

## Oxygen Level

- Safe: Between 19.5 - 23.5%
- Outside This Range:
  - Do Not Enter / Get Out Of The Confined Space
  - Introduce Fresh Air Using Forced Air Ventilation



# Confined Space Monitor Atmosphere



**Gas Monitor** Used Prior To And During Confined Space Entry To Monitor:

**Carbon Monoxide (CO)**

By-Product Of Combustion



- Colorless & Odorless Gas
- Symptoms:



# Confined Space Monitor Atmosphere



**Gas Monitor** Used Prior To And During Confined Space Entry To Monitor:

**Toxic Atmosphere** – Sources:

- Fumes From:
  - Cleaning
  - Welding, Cutting, Brazing, Soldering
  - Painting, Degreasing, Sealing, Bonding



# Confined Space Monitor Atmosphere



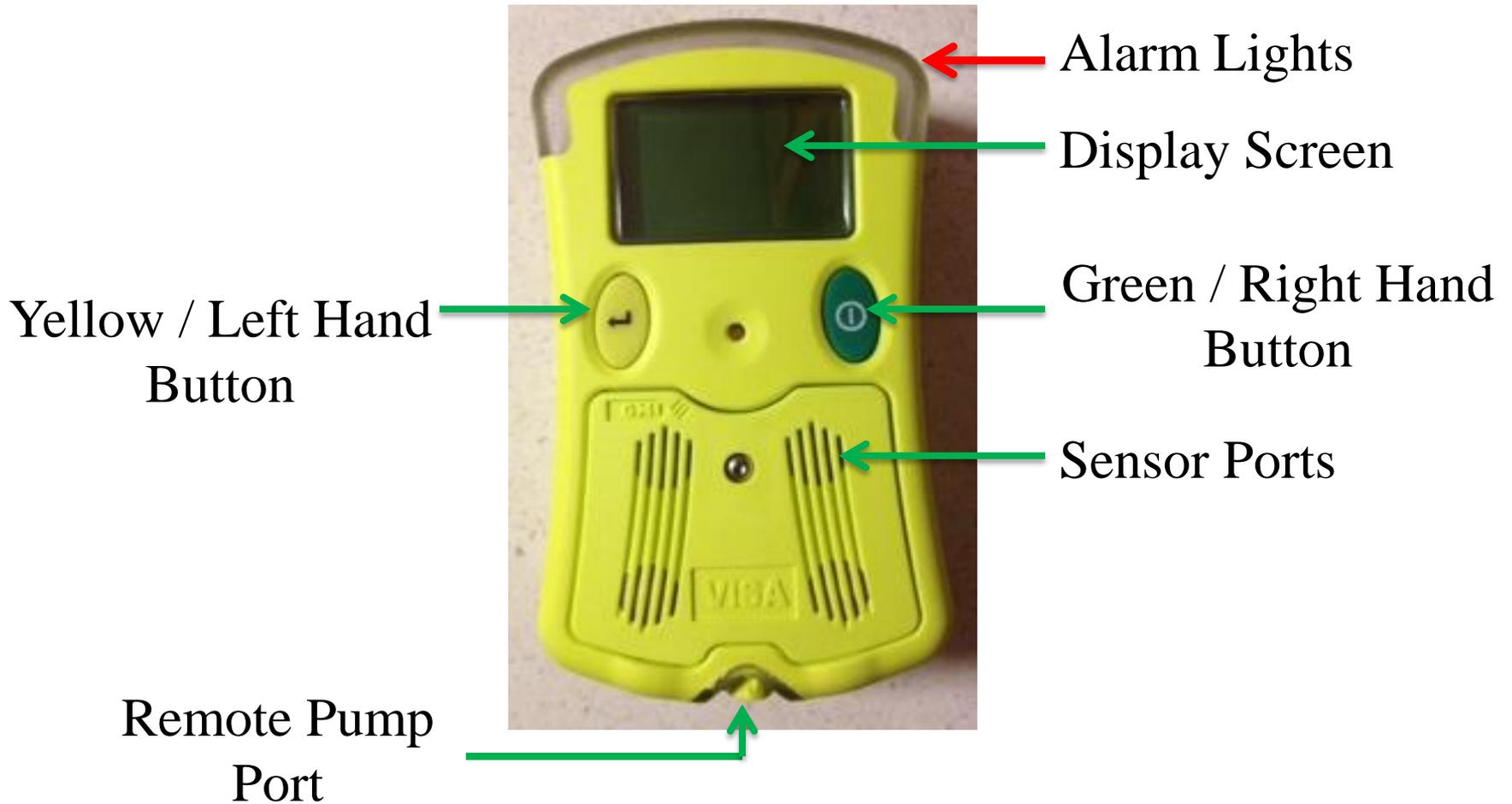
**Gas Monitor** Used Prior To And During Confined Space Entry To Monitor:

## **Hydrogen Sulfide** (H<sub>2</sub>S)

From Decomposition Of Organic Matter

- Colorless & Flammable Gas With Rotten Egg Odor
- Symptoms:
  - Low Exposure: Irritation of Eyes, Nose, Throat
  - Moderate Exposure: Headache, Dizziness, Nausea, Breathing Difficulty
  - Severe Exposure: Unconscious, Coma, Death

# VISA (Multi-Gas Monitor) - Operating Instructions



# VISA (Multi-Gas Monitor) - Operating Instructions

## TURNING ON The Instrument

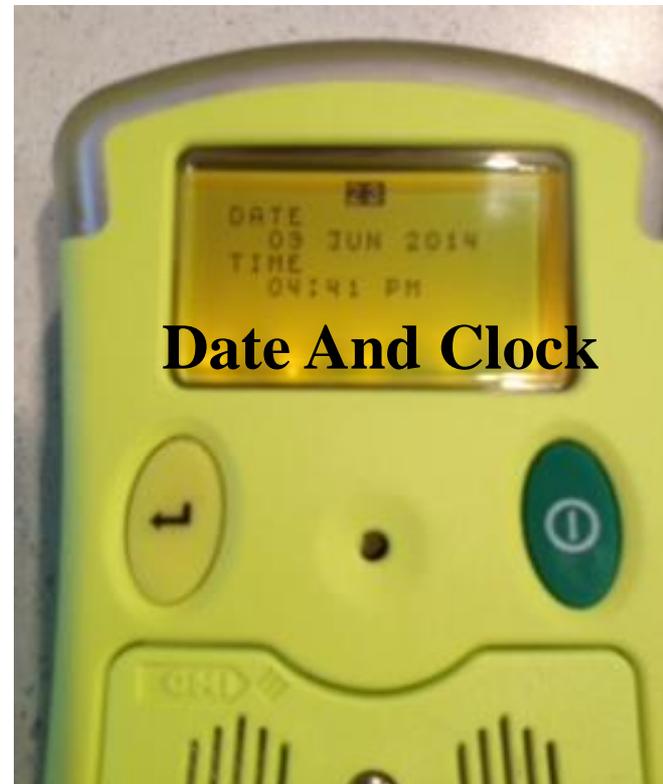
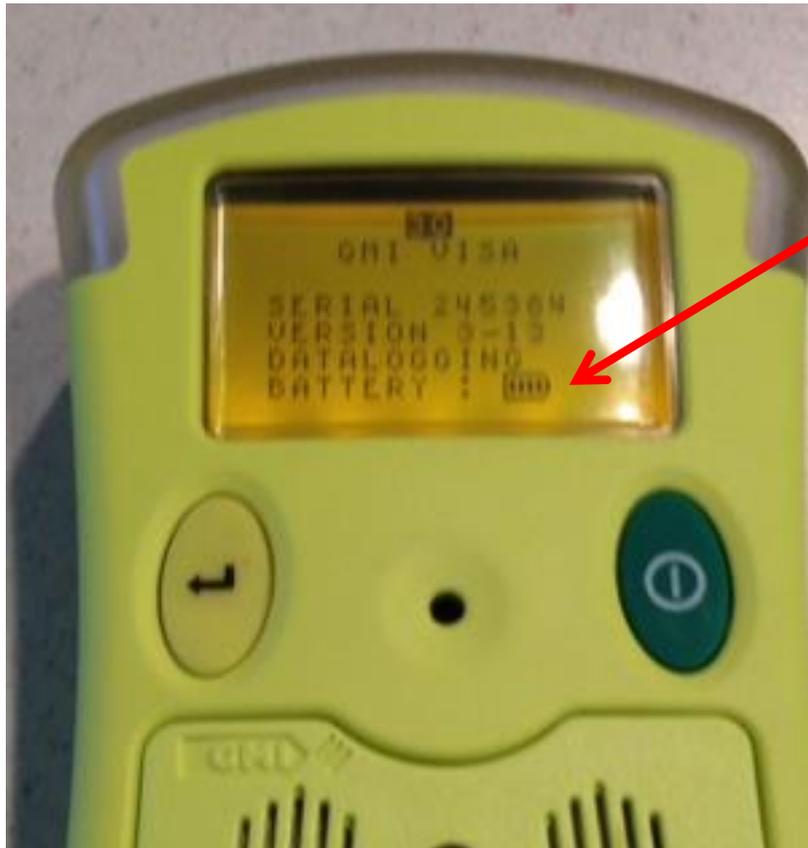
- **Turn On In Fresh Air**
- **Press And Hold Right/Green Button Until the Display Screen Lights Up**
  - **The Instrument Will Go Through A 30 Second Warm Up and Test Cycle**
  - **Pump, Display Screen Backlighting And Blinking Green Alarm Lights Turn On**



# VISA (Multi-Gas Monitor) - Operating Instructions

## 30 Second Test Cycle

- Instrument Identification
- Check The **Battery Level**
  - Full, 75%, 50%, 25% Or Low



**Date And Clock**

# VISA (Multi-Gas Monitor) - Operating Instructions

## 30 Second Test Cycle (cont.)

### Calibration Due Date Reminder



If The Calibration Due Date Has  
**EXPIRED**

Audible & Visual Alarms Activate  
“**CALIBRATION DUE**”  
Flashes On Screen

Press And Hold Green/Right  
Button To Acknowledge And Turn  
Off Alarms

After Job, Turn Into FM  
Maintenance Supply Shop

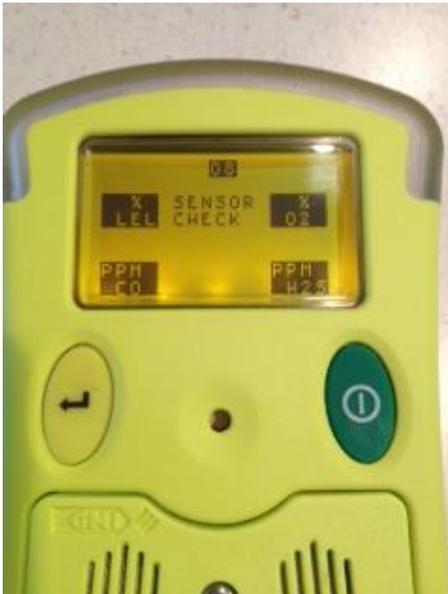
If “**CALIBRATION REQUIRED**”  
Audible & Visual Alarms Activate  
The Instrument Is Not Useable  
**Turn OFF**

Turn Into FM Maintenance Supply  
Shop For Re-Calibration

# VISA (Multi-Gas Monitor) - Operating Instructions

## 30 Second Test Cycle (cont.)

### Sensor Check:



Checks Appear For Sensors That Work And “Zeroed” Correctly



If A Spanner Symbol



Appears Over Any Sensor Or  
“ZERO FAULT”

Turn Off And Return Instrument To FM Maintenance Supply Room For Repair

# VISA (Multi-Gas Monitor) - Operating Instructions

## 30 Second Test Cycle - COMPLETED



**Pressing Green Button Once  
Turns On Display Screen  
Backlighting for 20 Seconds**

- **Pump And Lights Turn Off**
- **Sensors Show Current Readings**
- **Instrument Is Ready For Use**  
(Audible Beep & Light Every 15 Seconds)



# VISA (Multi-Gas Monitor) - Operating Instructions

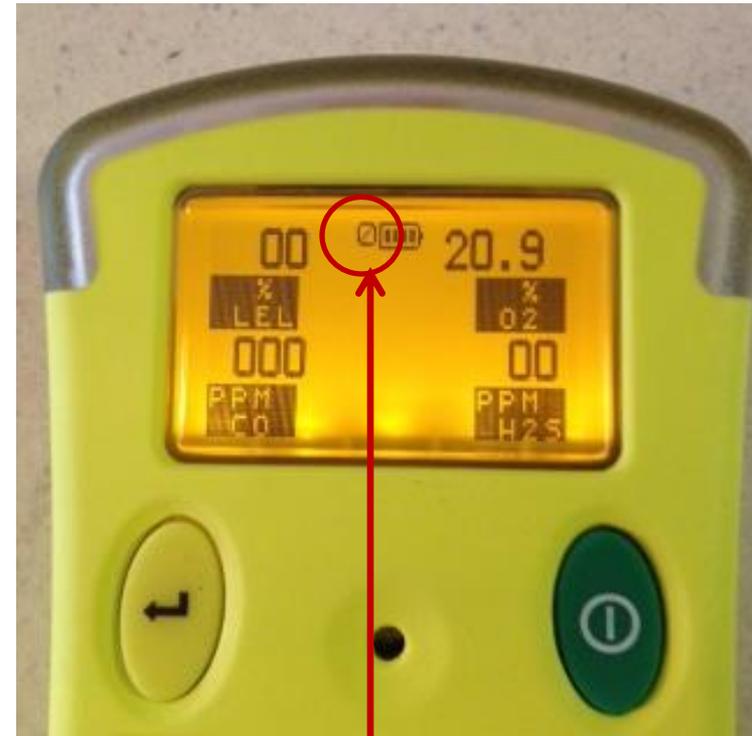
## REMOTE SAMPLING

The Sensors Work With The Pump Off  
Or To **Remotely Sample** (With A Tube):

- **Attach The Tube**



- Turn **ON** The Pump
  - Press And Hold The Green (Right) Button
    - **ON:** Pump Symbol Rotates 



**Rotating Symbol  
Pump = On**

# VISA (Multi-Gas Monitor) - Operating Instructions

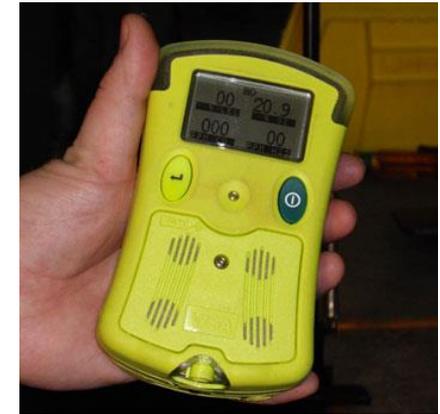
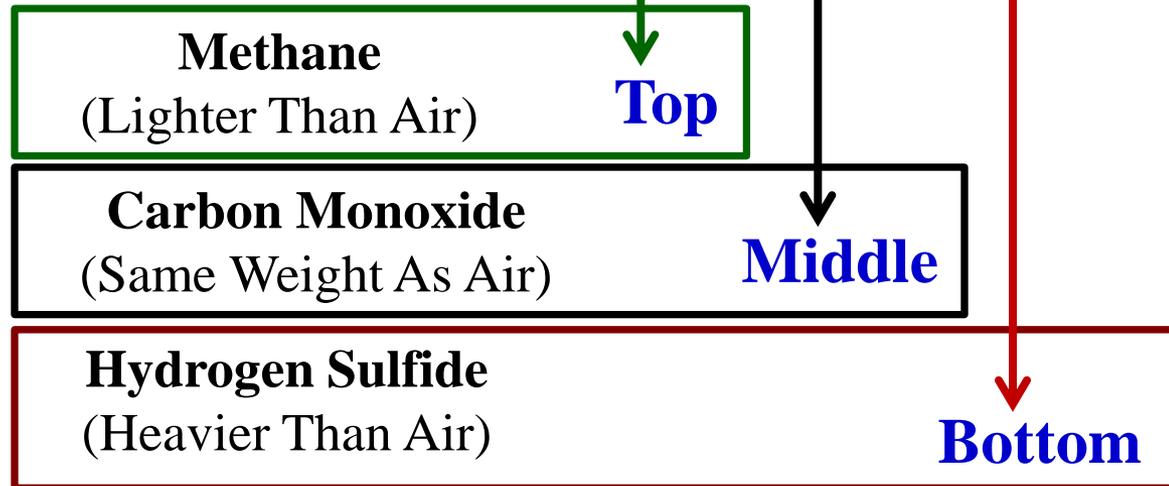
## REMOTE SAMPLING

Crack **Open the Cover &**



(Due to Different  
Gas Densities)

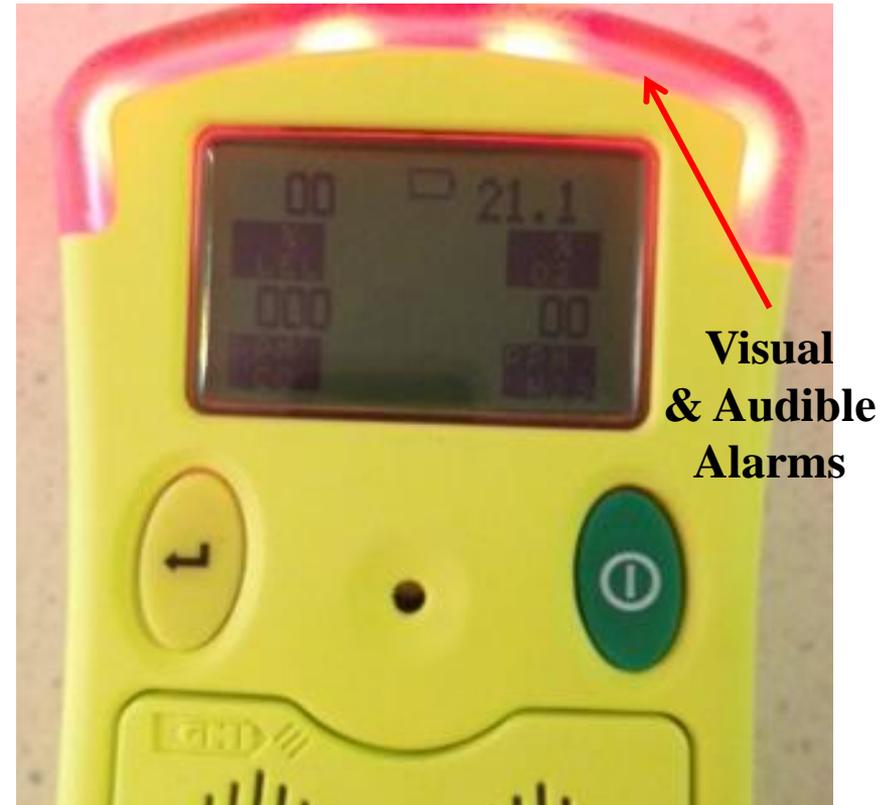
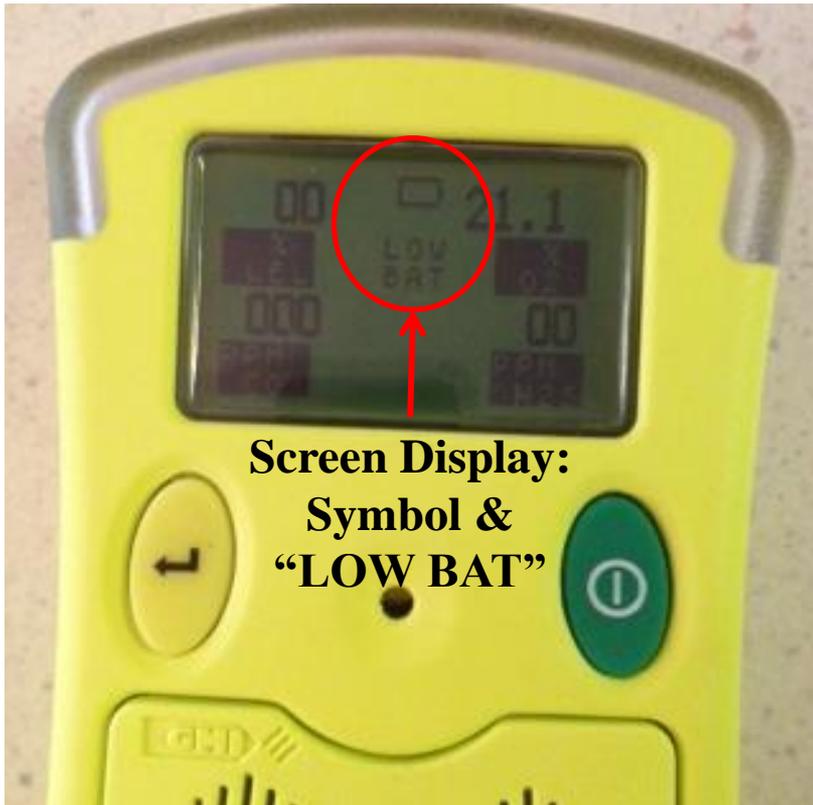
**Take Air Samples** At The:



**Then Remove the Cover & Turn On Ventilation, As Required**

# VISA (Multi-Gas Monitor) - Operating Instructions

**ALARMS:** LOW BATTERY - Approximately 30 Minutes Of Operation Remain



**"Battery Fault" - Shutdown Imminent (3 Minutes)!**  
**GET OUT!!!**

# VISA (Multi-Gas Monitor) - Operating Instructions

## **ALARMS:** LOW BATTERY - REPLACING BATTERIES

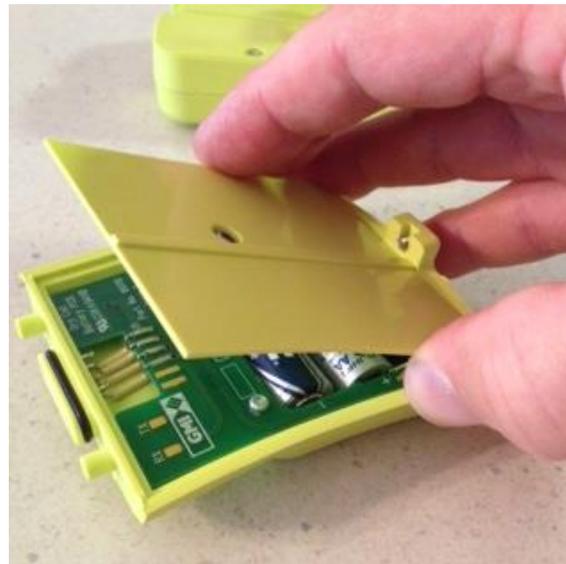


**Use Hex Wrench to Unfasten Set Screw**

**Use Pressure To Push And Remove Battery Pack**

# VISA (Multi-Gas Monitor) - Operating Instructions

## **ALARMS:** LOW BATTERY - REPLACING BATTERIES



**ONLY Use  
ALKALINE  
AA Batteries**



**Use Hex Wrench to Unfasten Set Screw  
Lift And Remove Battery Pack Cover  
Remove And Replace Batteries**

# VISA (Multi-Gas Monitor) - Operating Instructions

## **ALARMS:** LOW BATTERY - REPLACING BATTERIES



**Replace Lid On Battery Pack And Tighten Set Screw**

**Re-Insert Battery Pack Ensuring To Fit Tongue-And-Groove**

**Tighten Set Screw**

# VISA (Multi-Gas Monitor) - Operating Instructions

## **ALARMS:** Flow Fault

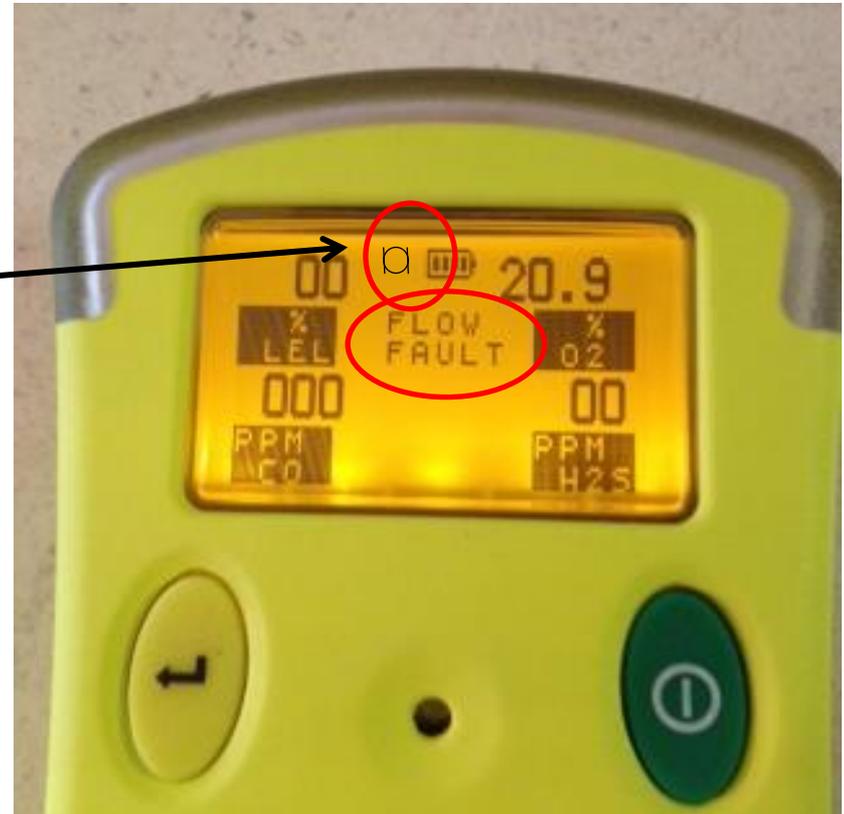
If The Rotating Pump Symbol



Changes To A “Flow Fault”  
Symbol



- Audible Alarm And Red Lights Activate
- Pump Will Stop
- Check For Blocked Remote Sampling Tube And Clean
- Restart Pump



# VISA (Multi-Gas Monitor) - Operating Instructions

## To Turn OFF:

Press Both The  
Yellow (Left Hand)

AND

Green (Right Hand)  
Buttons



## QUESTIONS?

## NEED MAINTENANCE?

See Kurt Patrick

In The  
FM Maintenance  
Supply Shop

Note: Regular Calibration  
& Maintenance Is Done By  
Our Vendor



# Confined Space Ventilation



**No Employee Shall Enter  
A Confined Space With A  
Hazardous Atmosphere**



**Forced Air Ventilation Shall Be Used**

- Air Supply Shall Be From A Clean Source
- Entry Is Permitted **ONLY** After Any Hazardous Atmosphere Is Eliminated
- Periodic / Continuous Atmospheric Testing Required
- Shall Continue Until All Employees Have Left The Space

# Confined Space Ventilation

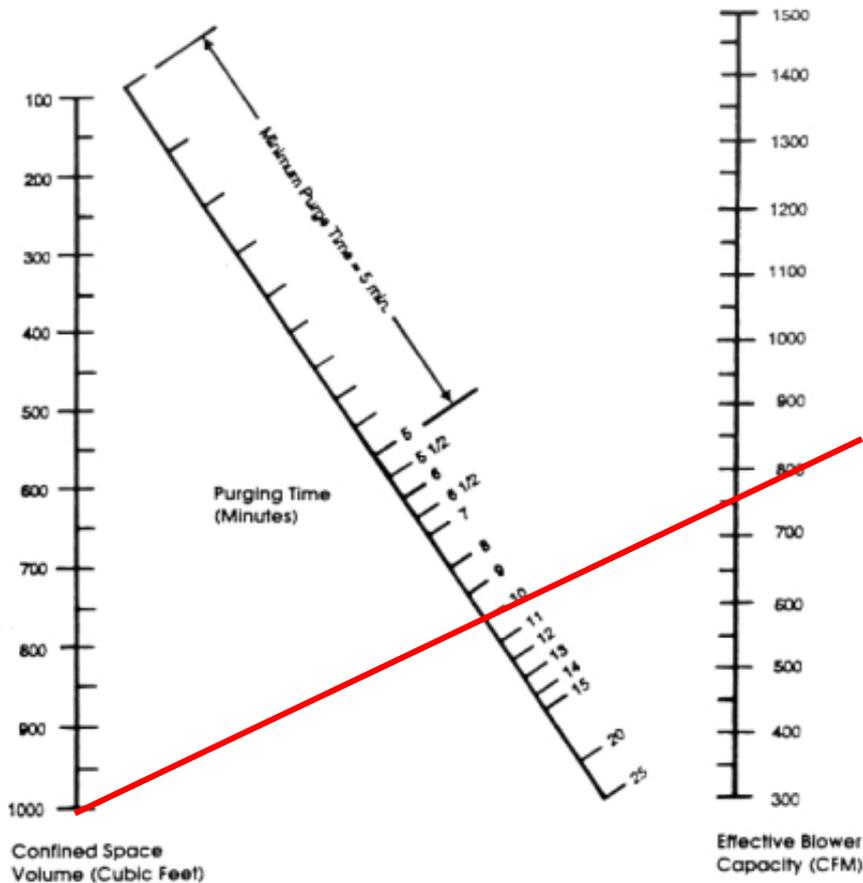


Chart Used To Estimate  
**Ventilation Purge Time**  
Based On:

- **Volume** of Confined Space
- **Capacity** of Blower

Example: 10' Cube with 750 CFM  
Blower Needs 10 Minute Purge Time

Then Check With Gas Monitor

# Confined Space Ventilation

**Place Intake In Clean Air**

i.e., Upwind Of Engine Exhaust



**Use Exhaust Ventilation When  
Welding Or Using Chemicals**

In Addition To Fresh Air Supply



# Confined Space

## Definition



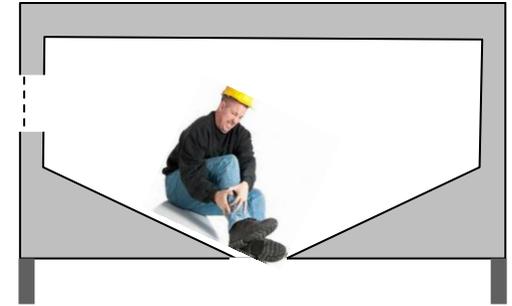
## Engulfment

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

# Confined Space

## Definition



## Configuration Hazard

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

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

Example: Interior  
of Cooling Tower



# Confined Space Definition

## Other Recognized Hazards

- Noise
  - Amplified Due To Acoustics Within The Space
  - Damages Hearing; Affects Communication
- Slick / Wet Surfaces
  - Slips And Falls
  - Increased Chance Of Electric Shock
- Falling Objects From Above
- Spiders, Snakes, Rodents...



# Confined Space Definition

## Other Recognized Hazards

- High Temperatures & High Humidity
  - Example: Steam Pits
- Psychological Issues
  - Example: Claustrophobia
- Worker's Poor Physical Condition
  - May Easily Cause Fatigue

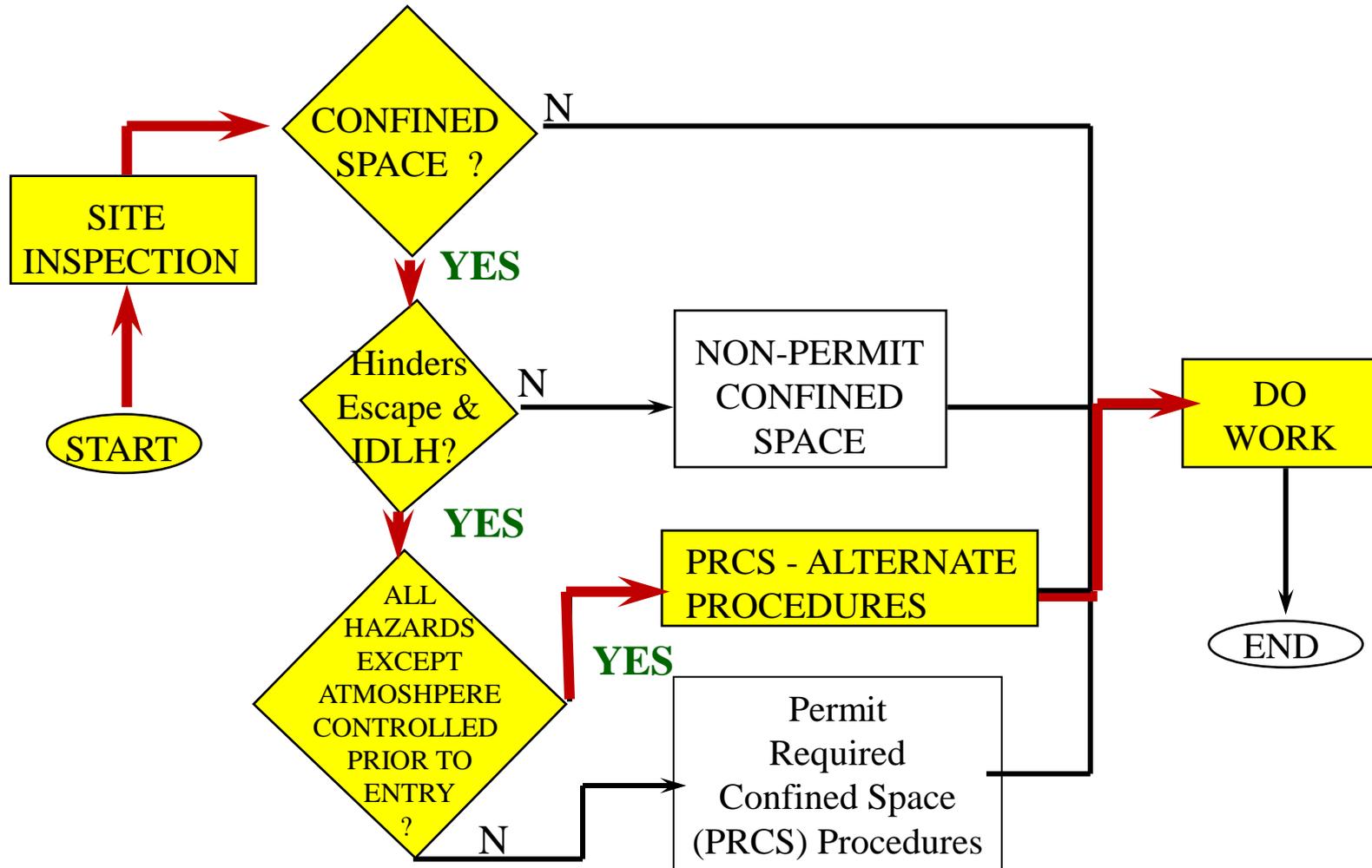




# Confined Space

## Decision Flowchart

Space **Is A Confined Space (Alternate Procedure)**

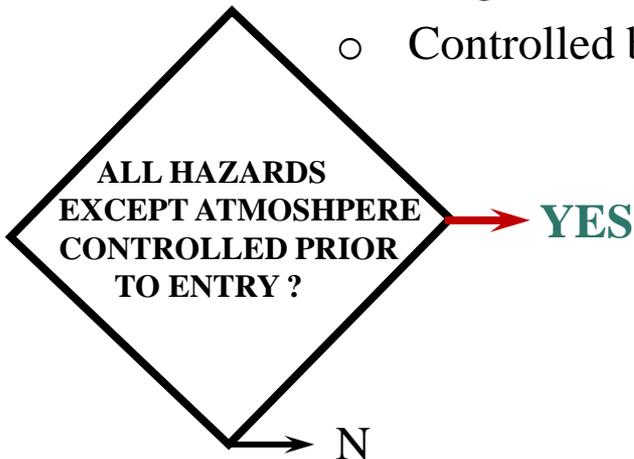


# Confined Space Decision Flowchart

## Space **Is A Confined Space (Alternate Procedure)**

A Written Permit is Not Required when:

- All Hazards inside the Permit Required Confined Space can be controlled from the outside
  - i.e., by means of Lockout-Tagout
- Except For A Hazardous Atmosphere Which Is
  - Purged or
  - Controlled by Mechanically Supplied Local Air prior to and during Entry



# Confined Space

## Contrast Permit Required vs. Alternate Procedures

REQUIREMENT	PRCS	ALT
- HAZARD RECOGNITION	X	X
- EQUIPMENT	X	X
- GAS MONITORING	X	X
- EVACUATION	X	X
- ENTRANT	X	X
- ATTENDANT	X	*
- SUPERVISOR	X	
- PERMIT	X	**
- RESCUE EQUIPMENT	X	

PRCS - Permit Required Confined Space procedures  
 ALT - Alternate PRCS procedures

\* - Two Man Policy Always

\*\* - Information Should Be Available

# Confined Space

## Training Required

All Facilities Management Trades Specialists Require:

- Confined Space Entry (Annually)
  - Instruction
  - Hands-on
- 1<sup>st</sup> Aid-CPR (Every 2 Years Per American Heart Association)
- Other Safety Training Such As:
  - Electrical Safety And Lockout-Tagout
  - Fall Protection
  - Other As Required



# Confined Space SUPERVISOR

- Assembles Entry Team
- Verifies Permit-Required Conditions
- Knows & Briefs Team Using Permit Form
- Calls Rescue To Place On Standby
- Authorizes Entry By Signing & Issuing Permit
- On Scene To:
  - Ensure Compliance With Terms Of Entry Permits
  - Remove Unauthorized Persons
- Terminates Permit
  - Unsafe Condition
  - Job Finished



# Confined Space

## ENTRANT

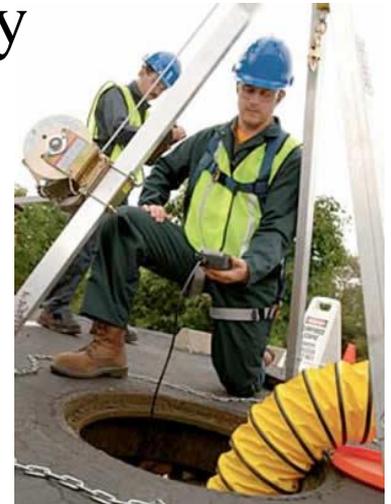
- Trained & Authorized Employee who Enters the Confined Space
- Must Know How To:
  - Recognize and Control Hazards Or Prohibited Condition
  - Use Equipment Properly For Entry
  - Communicate With Attendant
  - Alert Attendants Of Symptoms
  - **Self-Evacuate** Upon:
    - Attendant Or Supervisor Order
    - Recognizing Sign Or Symptom Of Exposure
    - Detecting Prohibited Condition
    - Gas Monitor Alarm Is Activated



# Confined Space

## ATTENDANT

- 1 Per Entrant For Entire Duration of Entry
- Monitors & Protects Entrants:
  - Condition of Entrants
  - Internal Confined Space Conditions
  - Conditions External to Confined Space
- Maintains Communication With Entrant
  - Warns of Hazardous Condition Inside or External to Confined Space Which Could Or Does Endanger The Entrants
- Orders Evacuation, As Required
- Only Performs Attendant (No Other) Duties

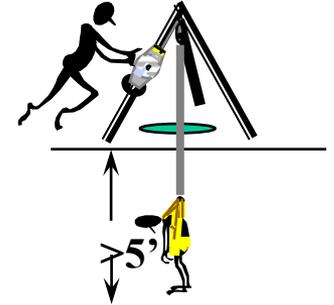


# Confined Space

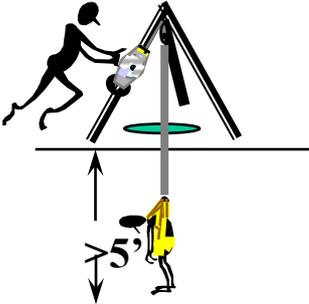
## ATTENDANT (cont.)

### When Entering A Permit Confined Space Over 5 Feet Deep

- Know How To Use Rescue Retrieval System
  - Tripod
  - Personnel Winch
    - Automatically Provides / Takes Up Slack
    - Fall Arrest (Within 2')
    - Retrieval (Manual Winch)
  - Entrants Don Body Harness



# Confined Space Rescue System



The Rescue System Consists Of:

- Tripod
- Carabiners
- Personnel Winches
- Full Body Harness



# Confined Space Rescue System

Gas  
Monitors



2 Personnel  
Winches  
(Orange)

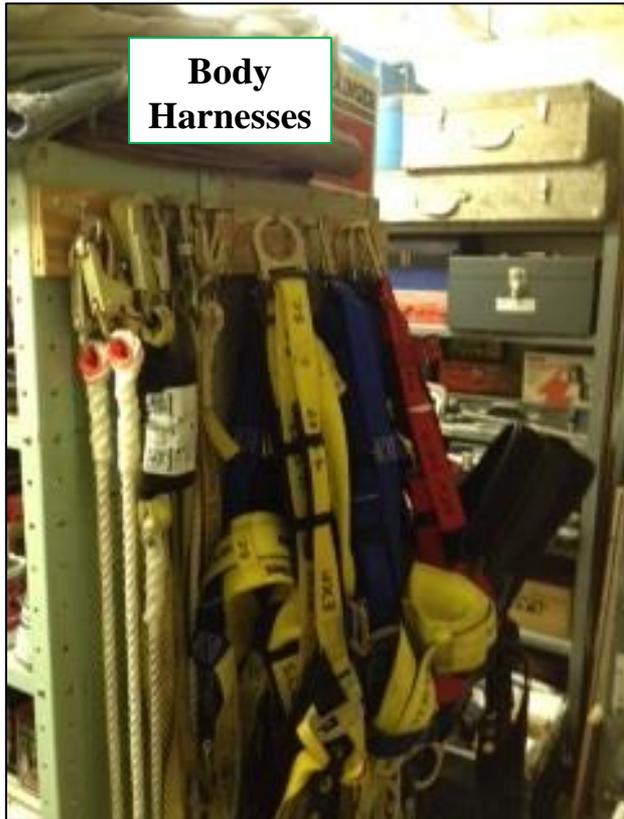
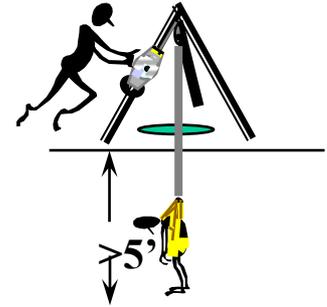
Equipment  
Winch  
(Black)

Confined Space Equipment Is  
Stored In The FM Tool and  
Equipment Room



Winches & Gas Monitors  
Are On Shelves Just Inside  
The Equipment Room Door

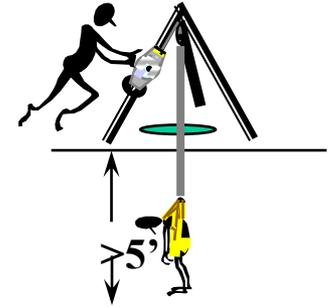
# Confined Space Rescue System



The Tripod &  
Body  
Harnesses  
Are All The  
Way  
In The Back  
Of The  
Equipment  
Room



# Confined Space Rescue System - Tripod



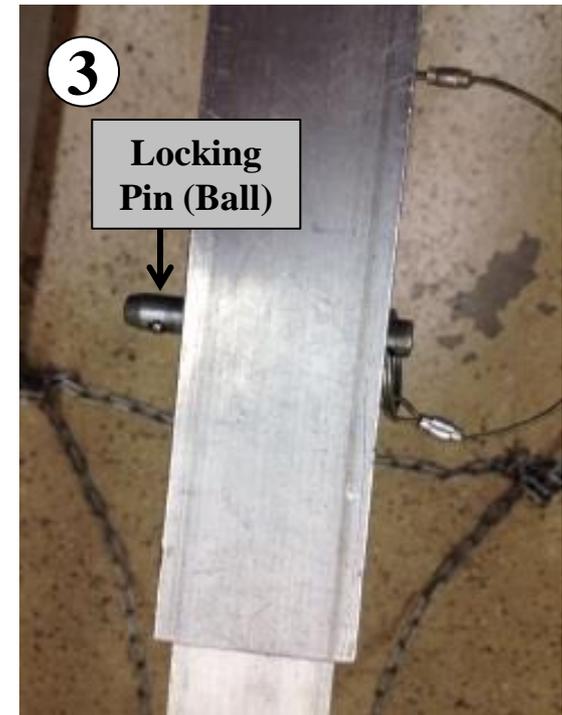
1. From The Stowed Position, Unsecure The Legs & Pull Out The Leg Locking Pins

2. Extend The Adjustable Legs To The Desired Length

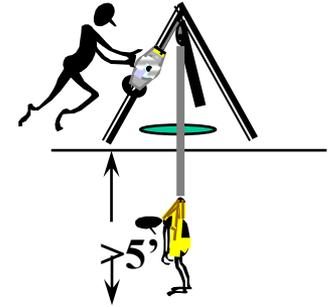
- Tripod Should Be Plumb
- At Least 4 Holes Must Show to Attach The Winches



3. Fully Insert the Leg Locking Pin (Locking Ball Must Show)



# Confined Space Rescue System - Tripod



Stand Up The Tripod

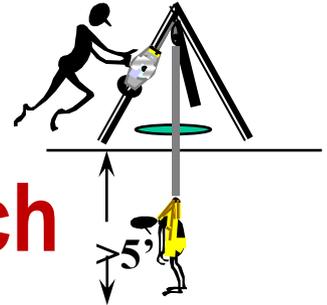
Ensure the Non-Slip Feet are **Down**

The Spreader Chain Is Designed  
To Keep The Tripod Legs From  
Splaying Should An Entrant Fall  
(Without It The Entrant Could Fall  
An Additional 5' to 6')



# Confined Space

## Rescue System – Personnel Winch



VS.



### Personnel Winch:

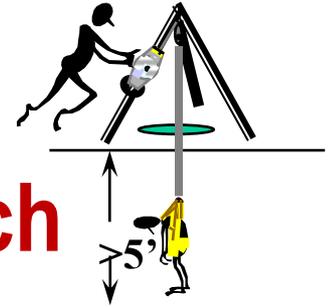
- For Retrieving Personnel Only (Manual Mode)
- Automatically Gives / Takes Up Slack
- Has Fall Protection

### Mechanical Winch:

- For Lifting Equipment Only
- Manual (Up / Down) Operation Only

# Confined Space

## Rescue System – Personnel Winch



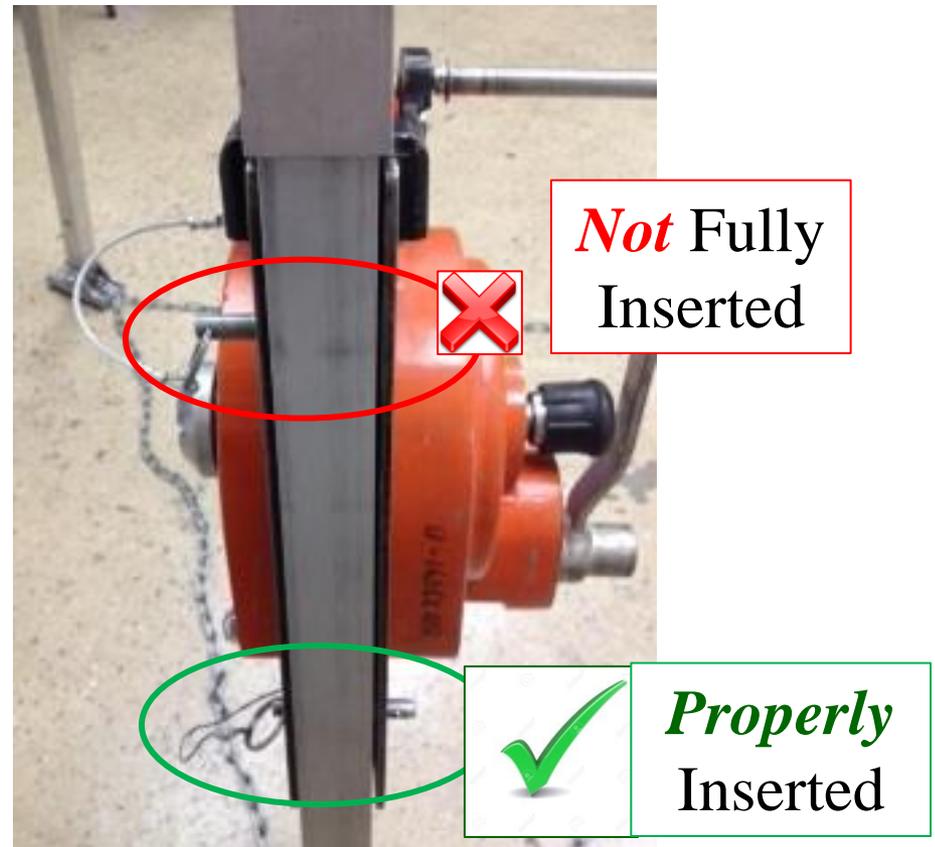
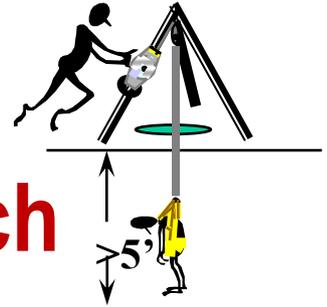
Slide Frame Of Winch Onto A Tripod Leg  
And Insert the 2 Attachment Pins Fully  
(Need 4 Holes Showing In Tripod Leg To Attach Winch)



# Confined Space

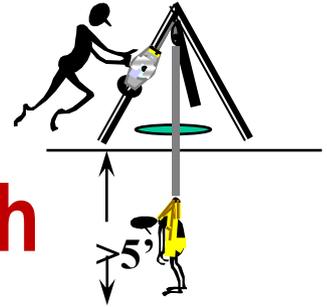
## Rescue System – Personnel Winch

### Winch Attachment Pins

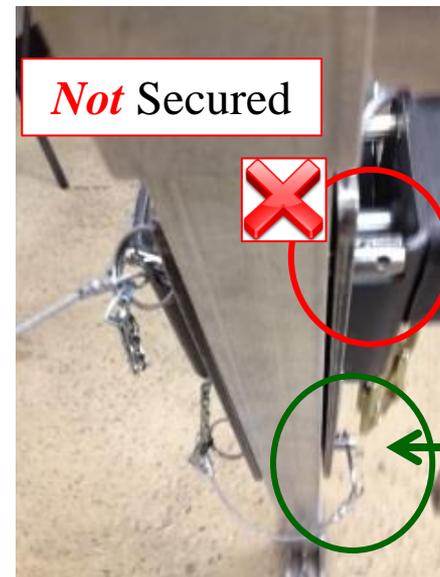


# Confined Space

## Rescue System – Materials Winch



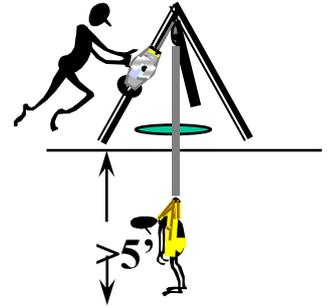
Attachment Pins



Install The Materials Winch The Same As The Personnel Winch

ALL Winches should be Installed On The *Inside* Of The Tripod Legs

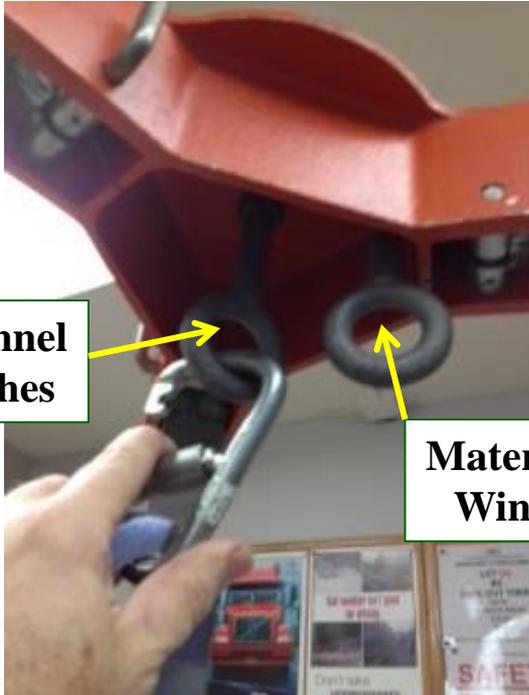
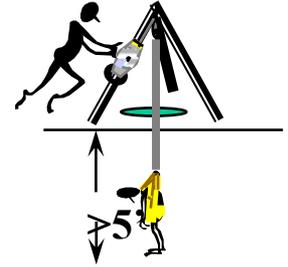
# Confined Space Rescue System – Pulleys



Winch Cables Are Placed Through Split Pulleys And Attached To Eyebolts In The Head Of The Tripod Using Carabiners



# Confined Space Rescue System – Carabiners



Personnel Winches

Materials Winch

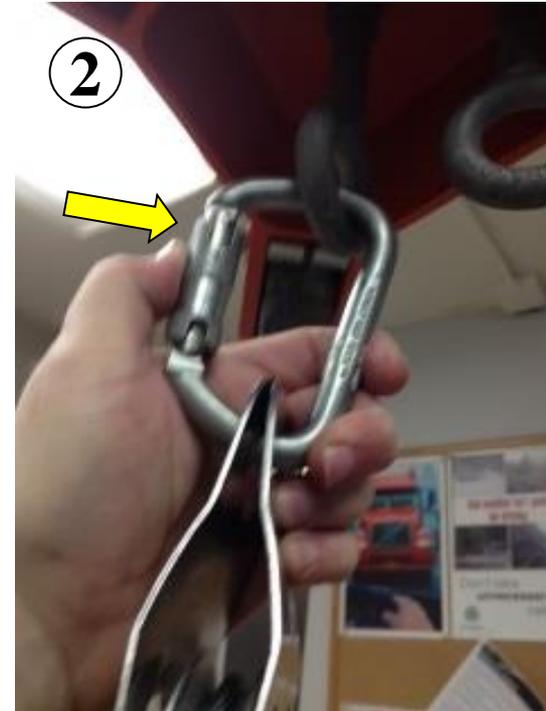
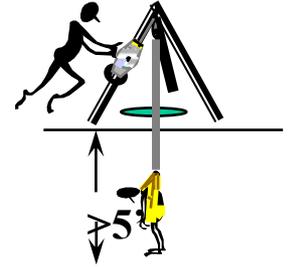
The Center Eyebolt On The Tripod Is Used To Attach Both Personnel Winches

Use The Offset Eyebolt For The Materials Winch



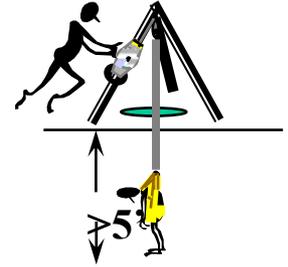
Do **NOT** Hang Carabiner On Other Carabiner

# Confined Space Rescue System – Carabiners



1. If Not Spring Loaded To Locked Position, Turn To Lock
2. Check Locked By Pushing On Latch

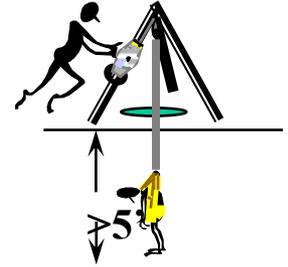
# Confined Space Rescue System – **Inspection**



Pull Out Winch Cables And Visually Inspect For Kinks, Breakage, Cleanliness And Other Damage

Do **NOT** Run Hand Along Cables; Rather Use a Rag  
(To Prevent Injuring Hand)

# Confined Space Rescue System – **Inspection**

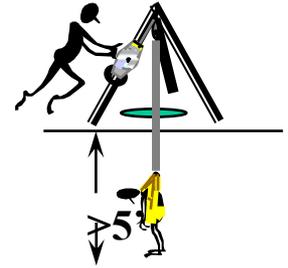


Snatch Check  
2' Max

Check Fall Protection On  
Personnel Winches By  
Snatching Cable

Do **NOT** Use  
If Brake Does Not Catch  
Within 2 Feet

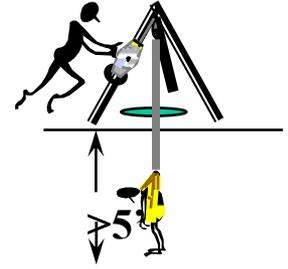
# Confined Space Rescue System – **Inspection**



Without Pressing To Unlock  
Check To Ensure The Latch  
On The Locking Snap Hooks  
Do Not Open By  
Pushing On The Latch

Do **NOT** Use  
If The Latch Opens  
(Without Also  
Pressing To Unlock)

# Confined Space Rescue System – Preparation



**Crank Handle - Stowed**



**Ready For Rescue**

Before Entry, Prepare The Personnel Winches  
For Potential Rescue By Removing The Crank  
Handle From The Stowed Position

# Confined Space

## ATTENDANT (cont.)

Rescue Of Entrant (Who is Unable To Self-Evacuate)

- **Do NOT Enter Confined Space To Effect Rescue**
  - 60% Of Confined Space Fatalities Are Would-be Rescuers
  - Instead Use **Non-Entry Rescue Retrieval System**



# Confined Space

## ATTENDANT (cont.)



### Rescue Of Entrant (Who is Unable To Self-Evacuate)

- Call **9-1-1** For Rescue/Emergency Services

NOTE: The Permit Has A Location For The Supervisor To Brief The Entry Team On Normal And Emergency Communications To Include An On Site Communications Check Prior to Starting Work

- Provide 1<sup>st</sup> Aid / CPR, As Required

<u>CONFINED SPACE ENTRY PERMIT</u>	
5. COMMUNICATION PROCEDURES:	
<input type="checkbox"/> VOICE	<input type="checkbox"/> TWO-WAY RADIO
OTHER: _____	
6. RESCUE PROCEDURES:	
<input type="checkbox"/> Two-Way Radio to EMFS Computer Control Room Checked	
<input type="checkbox"/> Telephone Available to Call Rescue Services and Checked	
Located at _____	PHONE: _____
(Within 25 feet of PRCS)	
<input type="checkbox"/> Rescue Service Coordinated and On Stand By	
UNIT: _____	PHONE: _____
Address: _____	
<input type="checkbox"/> Use Non-Entry Rescue Retrieval	
OTHER: _____	



# Confined Space Rescue Services

## DGS Facilities Management

- Does Not Have 1<sup>st</sup> Response / Rescue Unit
  - We Perform Non-Entry Rescue Only
- Supervisor Notifies Columbia Fire Dept. During Permit Briefing



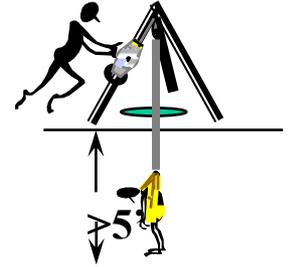
## Columbia Fire Department

- Will Only Be On Standby Until Called For Actual Emergency
- Has Been Provided Information on DGS Confined Spaces



# Confined Space

## ATTENDANT - External Rescue



The Attendant Will Need To Retrieve The Entrant Using The Personnel Winch In Manual Mode. To Engage The Crank:



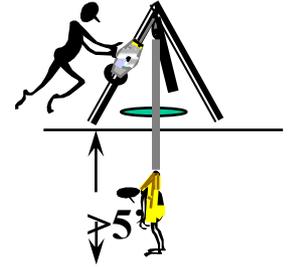
1. Push In The Knob



2. Rotate The Knob Clockwise  
1/4 Turn And Release

# Confined Space

## ATTENDANT - External Rescue



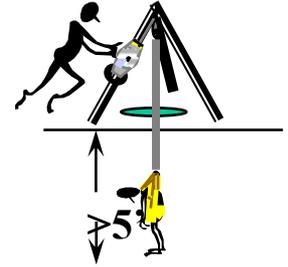
Turn The Crank Clockwise To Raise The Entrant  
(It May Take Several Turns Before The Crank Engages)



If The Entrant Gets Caught  
Reverse Crank To Lower

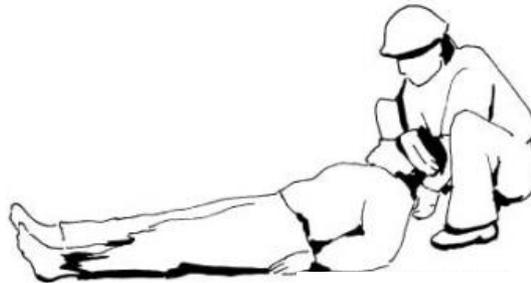
# Confined Space

## ATTENDANT - External Rescue



Raise The Entrant Until The Knees Are At Ground Level Then Reverse Crank To Lower The Entrant To The Ground

Ensure Positive Control Of The Entrant By Holding Onto The Back D-Ring



Disconnect And Drag To Safety To Give 1<sup>st</sup> Aid-CPR As Required



# Confined Space

## After Emergency

The Supervisor:

- Terminates The Permit / Further Entry Into The Confined Space
- Determines The Cause Of the Emergency
- Remedies The Cause Of the Emergency
  - *ONLY THEN* Can The Permit Be Re-Opened Or A New Permit Can Be Issued Later

If The Confined Space Cannot Be Made Safe For Entry Then The Supervisor Will Have To Hire A Qualified Contractor For Correction

# Confined Space

## Entry Terminated

Upon Job Completion:



- **Supervisor**
  - Closes Confined Space Entry Permit
  - Notifies Columbia Fire Dept.
  - Forwards Closed Permit to Records Coordinator
- **Records Coordinator**
  - Retains Closed Confined Space Entry Permits For At Least One (1) Year
  - Currently Is **Jean Paul Gouffray**, FM C&P, 737-8038; 2<sup>nd</sup> Floor of Forsythe Bldg. (915 Main St.)

# Confined Space

## End Of Course



**Contact Your  
Supervisor Or  
The Safety Office**

# Confined Space

## Course Exam

# Remember



To Receive Credit For This Course  
Turn In Your Completed Test To The  
Safety Office

Passing Grade is **70%** Or Better