

The Big Hole

in Confined Space Entry Training...

Gas Monitor Training!



*Protect Your Life.
Protect Your Investment.*

Presented by Jason Call
President, TINOSI, Inc.

Believe It Or Not...

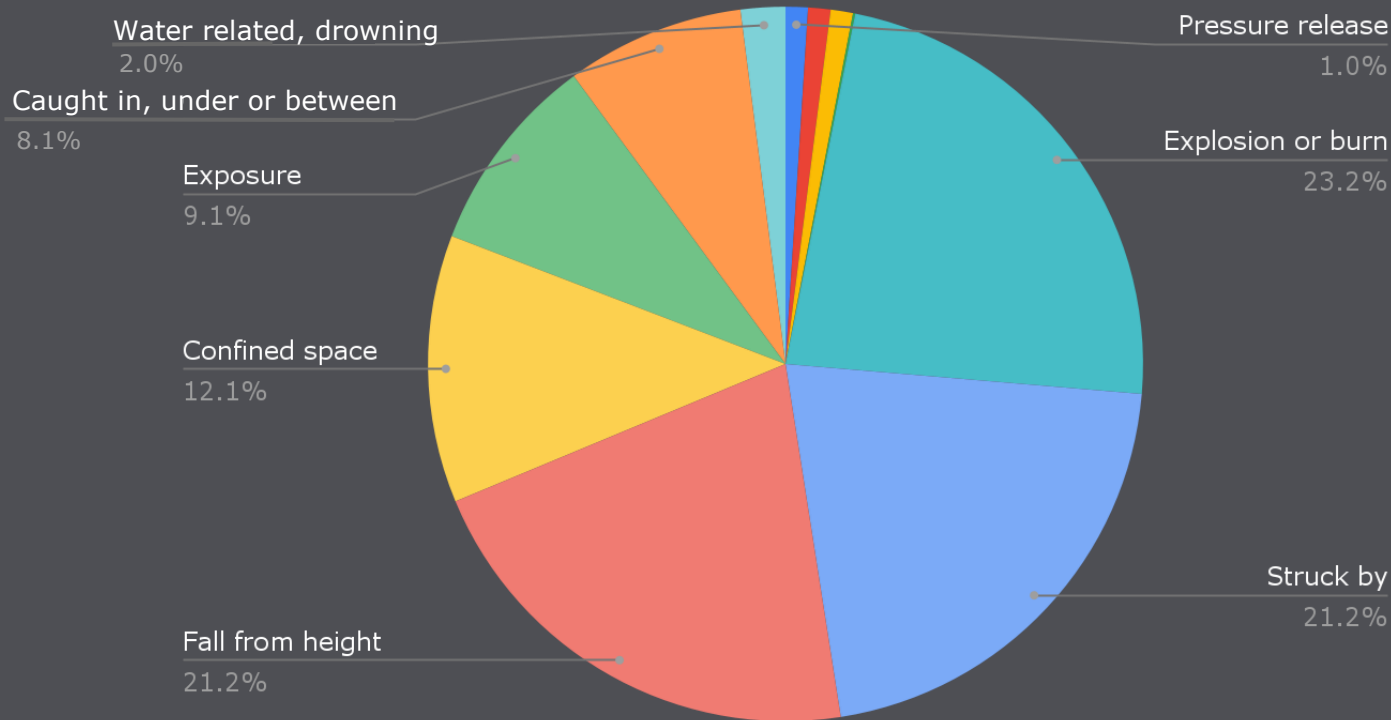
**OSHA Confined Space Entry
DOES NOT cover it!**

1910.146(h)(2)

“The employer shall ensure that entrants properly use equipment...”



Gas Detectors Save Lives!



What are the Options?

1. Give everyone the manual?
2. Manufacturer will train?
3. Send a leader to the factory?
4. Distributor will train?
5. Tribal knowledge?
6. YouTube?

Gas Monitor Competence Training



Protect Your Life. Protect Your Investment.

Google it to find providers.

Main Topics to Cover



- 1 Confined Spaces**
- 2 Gases and what they do to you**
- 3 Complete gas detector operation**
- 4 Alarms**
- 5 Sensors, Water, Battery**

- 6 Bump Testing**
- 7 Calibrating**
- 8 Troubleshooting**
- 9 Do's and Don'ts**
- 10 Maintenance**

What is a Confined Space?

01



Is This a Confined Space?



DANGER

**CONFINED SPACE
ENTRY BY PERMIT
ONLY**

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! DANGER



**CONFINED
SPACE**

Entry by
permit **ONLY.**

Permit Required Confined Space?



Gases and Your Body

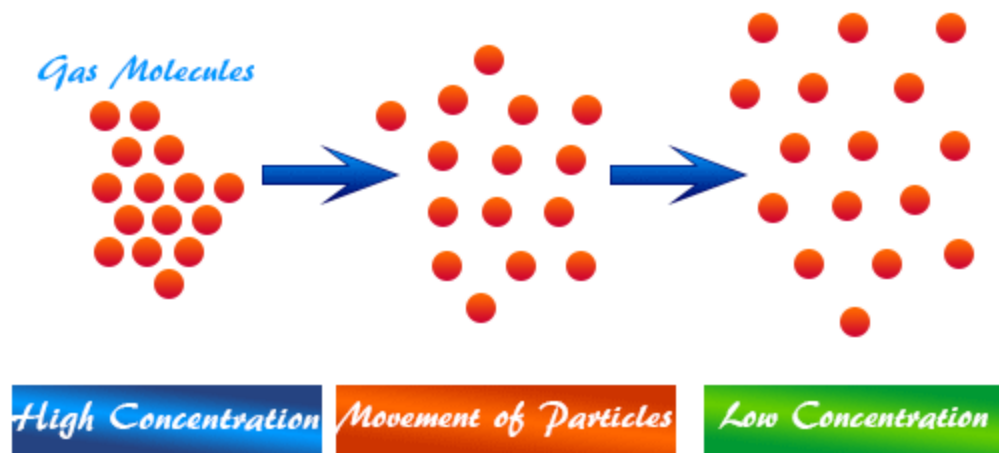
What do they actually do to you?





What is Diffusion?

Diffusion of Gases





**When gases spread
out evenly in the
surrounding air**

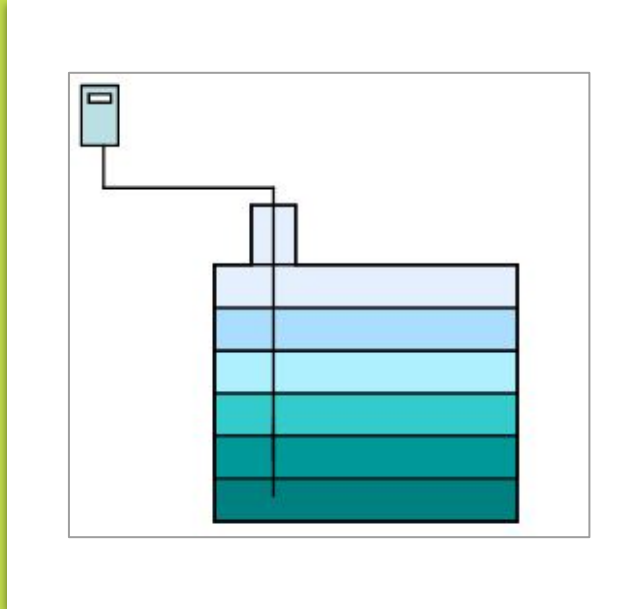


What is Stratification?



When gases of different weights separate over and under each other

Stratification



Oxygen (O₂)

Too little or too much of a good thing





**How much is in normal,
fresh air?**



20.9%





20.9% (Alarm goes off at 19.5%)

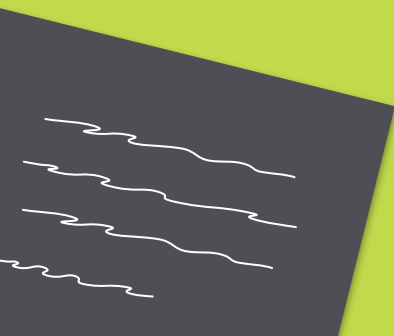
ALARM! (What does it mean?)

- I'm about to die? Not necessarily
- Something's weird
- Something's not natural
- Conservative to give you time to take action
- But it could turn deadly quickly

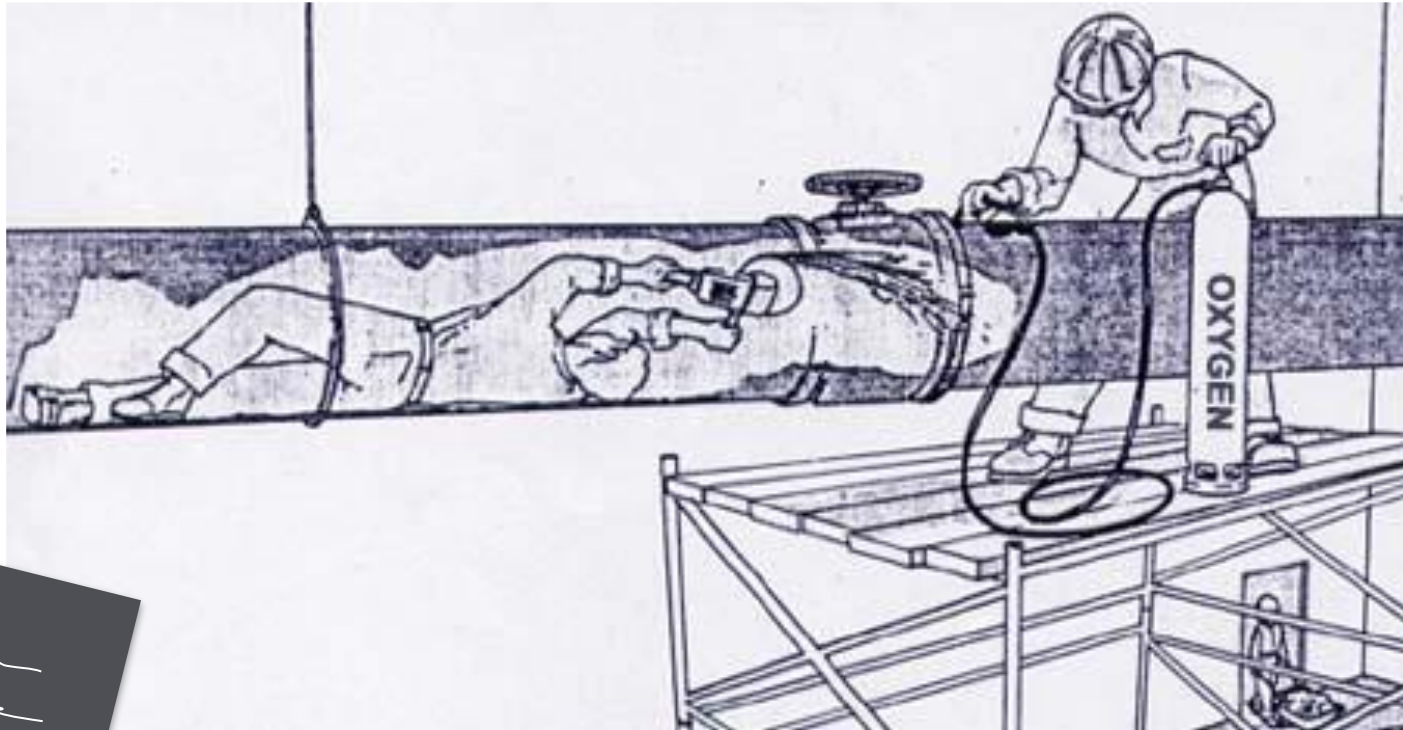
ALARM! NOW WHAT?

- DON'T LOOK AT THE SCREEN!
- GET OUT (but don't panic)
- Things can change very quickly!

Oxygen Deficiency



Oxygen (O₂)



Hydrogen Sulfide (H_2S)

Everyone's favorite!
It smells like... (Let's all say it together.)



Hydrogen Sulfide (H_2S)

Rotten Eggs!



Hydrogen Sulfide (H₂S)

God's amazing creation, the nose, can detect H₂S at less than one ppm (part per million)!

One penny in \$10,000 of pennies.

One car among cars lined up, bumper to bumper, from St. Louis to Los Angeles.



Hydrogen Sulfide (H₂S)

- Extremely dangerous and corrosive
- Rust
- Heavy
- Lives in the dark, wet
- 100ppm No Smell
- Breaks down easily
- Low alarm at 10ppm
- Hijacks blood cells

1.0 ppm

Smell

100 ppm

Rapid loss of smell

200 - 300 ppm

Eye inflammation, respiratory tract irritation after 1 hour, loss of consciousness with time

500 - 700 ppm

Death in 30 min. - 1 hr.

1000 ppm

Immediate respiratory arrest, loss of consciousness, followed by death

Carbon Monoxide (CO)

- Motors, engines
- No smell, invisible
- Same weight as air
- Low alarm is 35ppm (25ppm in CA)
- Hijacks red blood cells

10,000 ppm

Immediate unconsciousness, death in one minute

6400 ppm

Death in 10 to 15 minutes

1600 ppm

Headache, dizziness, nausea in 20 minutes, death in 1.5 to 2 hours

1500 ppm

IDLH (from NIOSH Pocket Guide, June 1990)

500 ppm

Death in four hours

200 ppm

Slight headache

50 ppm

OSHA's PEL



LEL means...?





LEL means...?

Lower Explosive Limit



Methane = Natural Gas



Methane = Natural Gas

100% LEL = KABOOM!

Methane = Natural Gas

100% LEL = KABOOM!

100% LEL = 5% v/v Methane

Methane = Natural Gas

100% LEL = KABOOM!

100% LEL = 5% v/v Methane

Low alarm is at 10% LEL

Manhole explosions



Sensors

101



Sensors 101

Different sensors work in different ways.
Just know this...



Sensors 101

1. They don't last forever

2. You can poison them

3. It's easy to know if they are dead or dying

The Pump

- It's only there for ONE REASON
- 1/2"/sec
- DO THE TWO MINS AT EACH LEVEL!



The Pump

Myths:

- The pump makes it more accurate. FALSE
- The pump gets faster readings. FALSE



Pump vs. Rope

Is the Rope Legal?

- Not for checking methane
- How to see the peaks
- OSHA DOESN'T LIKE IT... but it's legal in most cases



My Battery Lasts...

Not a big issue anymore.



Water Resistance

- A few droplets is ok
- Pump will alarm if blocked
- Prolonged or deep immersion will ruin the detector
- Pump without hose? Uh oh!



What to Know Before “Go!”



- ☑ Alarm Setpoints (TWA, STEL, High, and most important, Low)
- ☑ Self Test (Circuitry Test!)
- ☑ Auto Zero (May be automatic or may give you the option)
- ☑ Calibration due date or “Calibration Due Now”
- ☑ Flashing Light (does not mean go!)

Bump Test vs Calibration

Facts and Definitions



Bump Definition and Facts

- Proves the detector is doing its job and protecting you!
- Be sure ALL SENSORS are showing a response!
- “Before each day’s use,” is a fairly new wording.
- If you don’t know or trust the guy who used it before you.

Calibration

- Accuracy reset
- Adjusts internally
- Be sure you have a good bottle (expiration, pressure, balances)
- BW is 180 days
- RKI is 90 days
- RAE is 180 days
- MSA Altair 5X manual does not clarify



The Four Calibration Situations[©]

1. **By Default**
2. **New Sensor**
3. **Over Limit / Over Range**
4. **Failed Hard Zero (What's that?)**

Hard Zero® - The Cure All

- Fools the detector into thinking it's going to be calibrated
- Some call it a "hard reset," "fresh air calibration," or "fresh air zero"
- Forces the detector to recognize fresh air as fresh air
- Only do it in fresh air!
- Saves a ton of money and time. Keeps jobs on track.



Datalog

- 10-15 second snapshots
- Average memory is 60 hours of work time
- Keeps track of everything the detector did and sniffed
- Permissible in court of law
- Reveals that most accidents and deaths are due to bad choices



The background is a vibrant green color, scattered with various colorful confetti pieces including small circles, triangles, and streamers in shades of blue, red, yellow, and purple. A white rectangular box is centered on the page, containing the main text.

Congratulations!

You have successfully completed
Gas Monitor Competence Training!