

The background of the slide is a grayscale photograph of a confined space, likely a prison cell or a large storage cage. It features a grid of vertical and horizontal metal bars that create a series of rectangular openings. The lighting is somewhat dim, and the overall tone is somber and industrial.

Confined Spaces: Silent & Invisible Killers

Fatalities in Confined Spaces

2015 = 136

2016 = 144

2017 = 166

2018 = (Available in December 2019)

Confined Space Training

29 CFR 1910.146



This section does not apply to agriculture, to construction, or to shipyard employment (Parts 1928, 1926, and 1915 of this chapter, respectively).

Two men dead after being pulled from manhole in Pennsylvania, reports say.

7/10/19 By Talia Kaplan, Fox News

- **Two men** in Pennsylvania were pronounced **dead** Thursday afternoon after crews pulled them out of a manhole where they'd been working, according to reports.
- They said the cause of death remained under investigation. “**Gases and lack of oxygen are suspected,**” Fox 29’s Chris O’Connell reported.

Cal/OSHA Cites Two Employers for Carbon Monoxide Poisoning Incident at San Francisco Airport. 07/11/19 WorkersCompensation.com

Two plumbers were poisoned by **carbon monoxide while in a confined space** at San Francisco International Airport.

- Two plumbers working in a crawl space replacing underground sewer pipes for airline caterer on December 22, 2018.
 - The plumbers were using a gasoline-powered saw to cut through concrete
 - One of the workers to lose consciousness.
 - Emergency crews assisted the workers
 - One of whom was hospitalized for two days.
- Gate Gourmet, Inc.
 - Did not inform Gladiator Rooter & Plumbing that the crawl space was a permit-required confined space
 - Did not provide information on the potential hazards posed by entering the space.
 - Cal/OSHA cited \$18,000, one serious accident-related violation, failing to communicate confined space hazards and precautions.
- Gladiator Rooter & Plumbing
 - Did not have a safety and health program
 - Did not train workers.
 - Did not develop a confined space program, take steps to mitigate the hazards
 - Did not have a rescue plan.
 - Cal/OSHA cited \$50,850 for eight violations, including two serious accident-related, two serious, and four general in nature.

Confined Space Defined

1. Can Be Whole Bodily Entered

AND

2. Limited Or Restricted Means For Entry Or Exit

AND

**3. Not Designed For Continuous Employee
Occupancy**

Non-Permit Confined Space

- A confined space that does not contain or, with respect to **atmospheric hazards**, have the **potential to contain any hazard capable of causing death or serious physical harm.**

Can You Think Of Any Non-Permit Confined Spaces?



Typical Non-Permit Confined Spaces

- Crawl Spaces
- Attics
- Dropped Ceilings
- Vaults
- Plumbing Walls
- Walk In Freezers/Refrigerators
- Autoclaves/Ovens
- Utility Closets
- Paint Booth

Permit Required Confined Space (PRCS)

Confined space that has one or more of the following characteristics:

1. Contains or has the potential to contain a hazardous atmosphere

OR

2. Contains a material that has the potential for engulfing an entrant

OR

3. Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by sloped/tapered floors

OR

4. Contains any other recognized serious safety or health hazard

Hazardous Atmosphere

An atmosphere that may expose employees to the risk of

Death

Incapacitation

Impairment Of The Ability For Self Rescue (UNAIDED)

**Injury Or Acute Illness From One Or More Of The
Following Causes:**

Hazardous Atmosphere (cont'd)

Injury Or Acute Illness From One Or More Of The Following Causes:

- 1. Flammable gas, vapor or mist in excess of 10% of its lower flammable limit (LFL)**
- 2. Airborne combustible dust at a concentration that meets or exceeds its LFL**
- 3. Atmospheric oxygen concentration below 19.5% or above 23.5%**
- 4. Atmospheric concentration of any substance in Sub Parts G or Z which exceeds the PELs.**
- 5. Any other atmospheric condition that is immediately dangerous to life or health**

Typical Permit Required Confined Space

- Boilers & furnaces
- Pipelines
- Vaults & pits
- Process vessel
- Storage tanks
- Sewer & manholes
- Trenches & excavations
- Air handling units



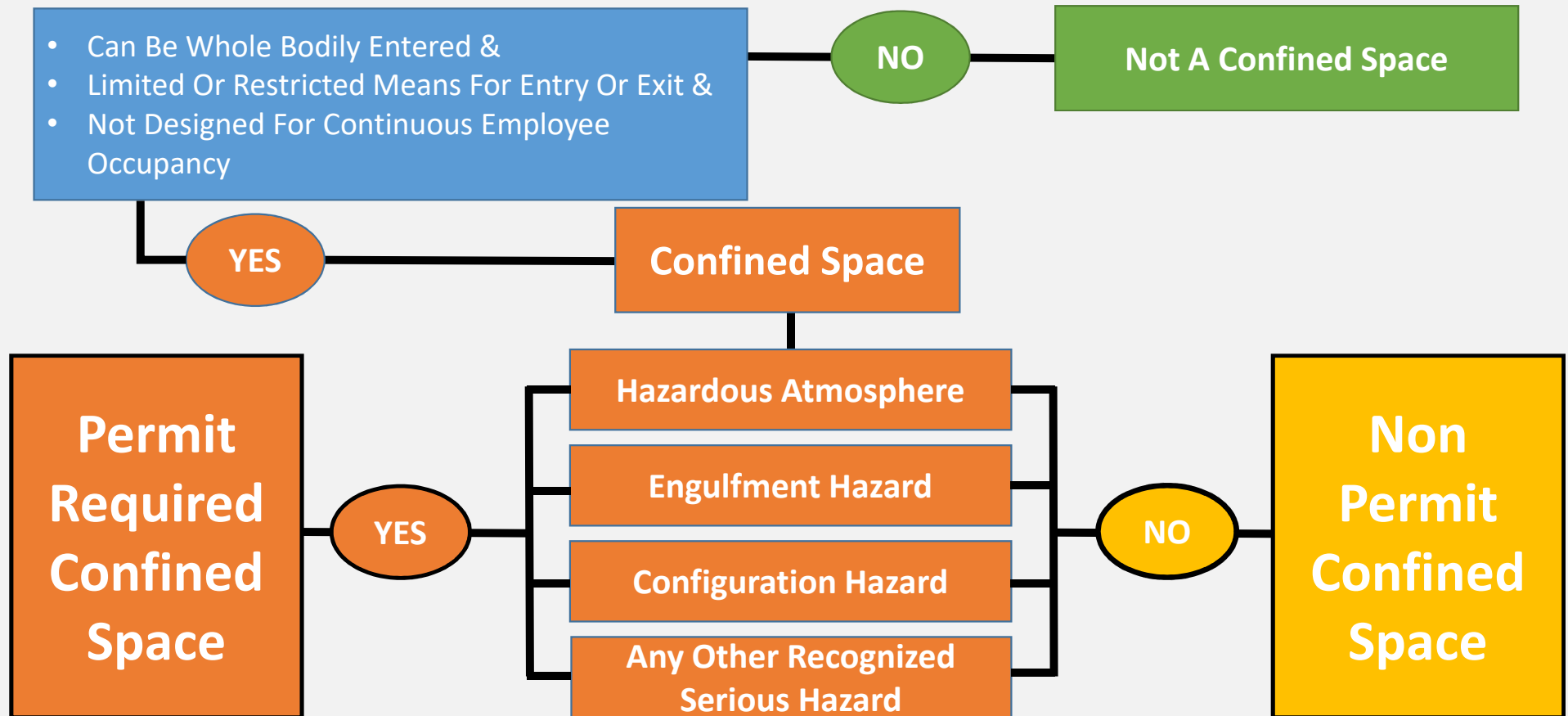
General Requirements.

1910.146(c)(1)

The employer **shall** evaluate the workplace to determine if any spaces are permit-required confined spaces.

NOTE: Proper application of the decision flow chart in Appendix A to section 1910.146 would facilitate compliance with this requirement.

Categorizing the Work Space



General Requirements.

1910.146(c)(2)



If the workplace contains permit spaces, the employer **shall** inform exposed employees, by posting danger signs or by any other equally effective means, of the existence and location of and the danger posed by the permit spaces.

NOTE: A sign reading DANGER -- PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER or using other similar language would satisfy the requirement for a sign.

General Requirements.

1910.146(c)(3)

If the employer decides that its employees will not enter permit spaces, the employer **shall** take effective measures to prevent its employees from entering the permit spaces and **shall** comply with paragraphs (c)(1), (c)(2), (c)(6), and (c)(8) of this section.

1910.146(c)(6)

When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the employer **shall reevaluate** that space and, if necessary, reclassify it as a permit-required confined space.

General Requirements.

1910.146(c)(8)

When an employer (host employer) arranges to have employees of another employer (contractor) perform work that involves permit space entry, the host employer **shall**:

1910.146(c)(8)(i)

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 this section;

1910.146(c)(8)(ii)

Apprise the contractor of the elements, including the hazards identified and the host employer's experience with the space, that make the space in question a permit space;

1910.146(c)(8)(iii)

Apprise the contractor of any precautions or procedures that the host employer has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;

1910.146(c)(8)(iv)

Coordinate entry operations with the contractor, when both host employer personnel and contractor personnel **will be working in or near permit spaces**, as required by paragraph (d)(11) of this section; and

1910.146(c)(8)(v)

Debrief the contractor at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.

General Requirements.

1910.146(c)(4)

If the employer decides that its **employees will enter permit spaces**, the employer shall develop and implement a **written permit space program that complies with this section**. The **written program shall be available for inspection by employees and their authorized representatives.**

"Permit-required confined space program (permit space program)" means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

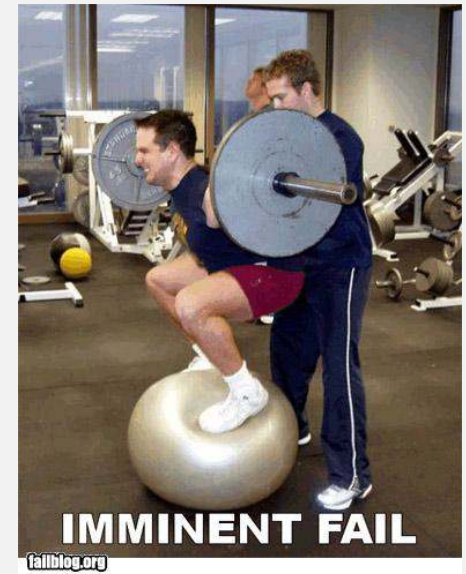
"Permit system" means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Physical Hazards

- Thermal effects
- Noise – Distraction, stress, hearing damage
- Vibration
- Structural
- Corrosives
- Falling Objects – Topside openings

Other Hazards

- Unstable work surfaces
- Falling Objects
- Insects or Animals
- Biological



Secondary Hazards

Changeable Conditions

- Oxygen Usage
- Material Build-up
- Re-Entrainment
- Introduction of Material
- Outside Work

Permit Required Confined Space

Required Elements

- Written Program
- Space Specific Entry Procedures
- Training
- Duties of Authorized Entrants
- Duties of Attendants
- Duties of Entry Supervisors
- Rescue and Emergency Services
- Employee Participation

Confined Space Written Program

- Identify All Confined Spaces
- Notification and Warning
- Hazard Identification
- Equipment & Entry Rescue
- Evaluation of Confined Spaces
- Permits
- Authorized Entrants & Attendants
- Authorized Entry Supervisors
- Entry Procedure for Each Space
- Communication Procedures
- Rescue Procedures
- Training Requirements



Informing Team Members

Inform **ALL** workers of existence, location and danger of confined spaces by:

- Posting Danger signs
- Any other equally effective means
- Basic Entry Procedures, Site Confined Spaces, and Hazards

Entry Permits

Should at a minimum include:

- Space to be entered
- Purpose of entry
- Date & Authorized Duration of permit
- Authorized Entrants
- Authorized Attendants
- Name & Signature of Entry Supervisor

- Hazards of the Permit Space
- Isolation of hazard control measures
- Acceptable entry conditions
- Results of initial & periodic atmospheric monitoring
- Rescue & Emergency Services
- Communication procedures
- Equipment required for entry

The image shows a sample 'ENTRY PERMIT' form. It is a structured document with multiple sections. At the top, it has a title 'ENTRY PERMIT' and a subtitle 'A permit is required for entry into a confined space where there is a potential for hazardous conditions'. Below this, there are sections for 'GENERAL INFORMATION' (including location, date, and time), 'REQUIREMENTS TO BE COMPLETED PRIOR TO ENTRY' (listing various safety checks and equipment), 'ATMOSPHERIC MONITORING' (a table for recording gas levels), 'ISOLATION OF HAZARD CONTROL MEASURES' (listing lockout/tagout and other isolation methods), 'AUTHORIZED PERSONNEL' (listing entrants and attendants), and 'RESCUE AND EMERGENCY SERVICES' (listing the responsible party and contact information). The form is designed to be filled out by the entry supervisor and the entrants.

Responsibilities

- Entrant
- Attendant
- Entry Supervisor
- Employer
- Regular Employee
- Contractors



Training

The employer **shall** provide training so that all affected employees acquire the following attributes necessary for the safe performance of their duties assigned under this program:

- Understanding
- Knowledge
- Skills

Knowledge – Is a body of information applied directly to the performance of a function.

Skill – Is an observable competence to perform a learned psychomotor act.

Ability – Is competence to perform an observable behavior or a behavior that results in an observable product.

Training

Training **shall** be provided to each affected employee under this program

- Before the employee is first assigned duties.
- Before there is a change in assigned duties.
- Whenever there is a change in permit space operations that presents a hazard an employee has not previously been trained.
- Whenever the employer has reason to believe there are deviations from the permit space entry procedures.
- When there are inadequacies in the employee's knowledge or use of these procedures.

Training

The training **shall** establish **employee proficiency** in the duties required by this program and **shall** introduce new or revised procedures, as necessary, for compliance with this program.

- The employer shall certify that the training required of this program has been accomplished.
- The certification shall contain each
 - Employee's name
 - Signatures or initials of the trainers
 - Dates of training.
- The certification shall be available for inspection by employees and their authorized representatives.

Authorized Entrant Responsibilities

Demonstrates competencies in the use of the following:

- Monitoring Equipment
- Ventilating Equipment
- Communications Equipment
- Lighting Equipment
- Barriers & Shields
- Ladders
- Rescue & Emergency Equipment

Duties of Authorized Entrants

Entrant needs to alert the attendant whenever:

- The entrant recognizes any warning sign or symptom of exposure
- A dangerous situation develops
- The entrant detects a prohibited condition

Authorized Entrant Responsibilities

- Is Familiar With Specific Confined Space Related Hazards
- Can Recognize Exposure Symptoms
- Wears PPE as Instructed and Trained
- Remains in Constant Communication with Attendant
- Knows Evacuation Procedures and Can Implement Them
- Exits the Confined Space and Alerts the Attendant if a Hazardous Condition Arises

Authorized Attendant Responsibilities

An individual stationed outside one or more permit spaces who:

- Monitors the authorized entrants, and
- Performs all attendant duties assigned in the employer's permit space program

Authorized Attendant Responsibilities

Duties of attendants are similar to those of an entrant:

- Knowledge of the hazards
- Chemical exposure pathways
- Signs and Symptoms of Exposure
- NEVER leave the space unattended

Authorized Attendant Responsibilities

Evacuate the space immediately if any of the following conditions become evident:

- Detection of a prohibited condition
- Detection of behavioral effects of hazard exposure in authorized entrants
- Detection of a situation outside the space that could endanger the authorized entrants
- NEVER leave the space unattended

Authorized Attendant Responsibilities

Evacuate the space immediately if any of the following conditions become evident:

- If the attendant cannot effectively and safely perform all of his/her duties
- If communication between the entrant and the attendant is jeopardized in any way
- NEVER leave the space unattended

Authorized Attendant Responsibilities

- Summoning rescue and other emergency services if needed
- Warn unauthorized persons that they must stay away from the permit space
- Advise unauthorized persons to exit space immediately if they have entered
- Perform non-entry rescue as specified

Authorized Attendant Responsibilities

- Performing no duties that may interfere with attendant's primary duty to monitor and protect the authorized entrants
- Notifies the Rescue Team if Necessary
- Remains at Post Until Relief or Rescue Team Arrives
- Returns Expired Permit to Qualified Person

Entry Supervisor Responsibilities

- Know the hazards of the space
- Routes of entry for chemicals
- Signs & Symptoms of Exposure
- The Consequences of Exposure

Entry Supervisor Responsibilities

- Verify all appropriate check-offs have been made on the confined space entry permit
- Verify all test specified on the confined space procedure have been conducted
- Ensure that all confined space entry procedures have been met prior to entry and authorization of the entry person

Entry Supervisor Responsibilities

- Verification that the means of summoning rescue services are operable
- Removal of unauthorized personnel who enter or attempt to enter the confined space during entry operations
- Verify the space is ready to be placed back into service

Entry Supervisor Responsibilities

- Note any modifications or procedures changes for subsequent entries of warranted
- Document and problems encountered during the de-briefing , with the entry on the entry permit

Employer Responsibilities

- Implement Confined Space Entry Program
- Identify All Confined Spaces
- Identify and Implement Hazard Control Measures
- Provide Employee Training
- Determine and Provide Adequate PPE
- Provide for A Rescue Team

Regular Employees Responsibilities

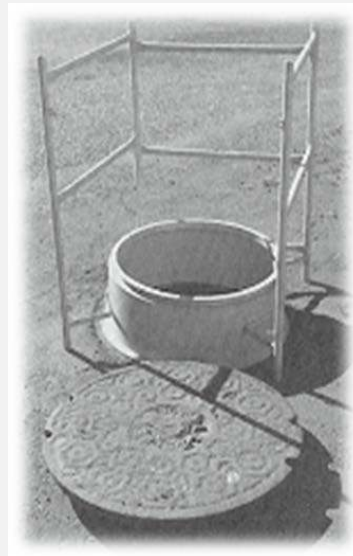
- Understand the Locations of Confined Spaces
- Understand Entry Restrictions
- Know the Qualified Person to Initiate Entry Procedures

Contractors Responsibilities

- Ensure Contractors Who Work in or Near Confined Spaces Are Aware of the Confined Space Program,
 - Locations of the Confined Spaces and
 - The Operations That Are Performed Near the Confined Space
- Ensure That Contract Employees Are All Adequately Trained

Access Control

- Ensure the attendant is positioned near the confined space entrance
- The area surrounding the permit space should be secured:
 - Barriers (cones, tape, vehicles)
 - Signage



Identification & Evaluation

The procedure at a minimum contains methods:

- Identify confined space hazards
- Purge, flush and ventilation requirements
- For atmospheric testing and acceptable limits
- Determining rescue equipment needs
- Determining entry support equipment needs
- For isolation purposes

Isolation

- Blanking or Blinding
- Misaligning
- Double Block and Bleed
- Lockout of Energy Sources
- Blocking

Pre-Entry Procedures

- Energy Isolation
- Space Evaluation

Under what circumstances will stairs or ladders constitute a limited or restricted means of egress under the standard?

Ladders, and temporary, movable, spiral, or articulated stairs will usually be considered a limited or restricted means of egress. Fixed industrial stairs that meet OSHA standards will be considered a limited or restricted means of egress when the conditions or physical characteristics of the space, in light of the hazards present in it, would interfere with the entrant's ability to exit or be rescued in a hazardous situation.

Resource

OSHA Instruction CPL 2.100 May 5, 1995 Directorate of Compliance Programs

Subject: Application of the Permit-Required Confined Spaces (PRCS) Standard, 29 CFR 1910.146.

Does the fact that a space has a door mean that the space does not have limited or restricted means of entry or exit and, therefore, is not a "confined space"?

A space has limited or restricted means of entry or exit if an entrant's ability to escape in an emergency would be hindered. The dimensions of a door and its location are factors in determining whether an entrant can easily escape; however, the presence of a door does not in and of itself mean that the space is not a confined space. For example, a space such as a bag house or crawl space that has a door leading into it, but also has pipes, conduits, ducts, or equipment or materials that an employee would be required to crawl over or under or squeeze around in order to escape, has limited or restricted means of exit. A piece of equipment with an access door, such as a conveyor feed, a drying oven, or a paint spray enclosure, will also be considered to have restricted means of entry or exit **if an employee has to crawl to gain access to his or her intended work location**. Similarly, an access door or portal **which is too small to allow an employee to walk upright and unimpeded** through it will be considered to restrict an employee's ability to escape. OSHA published a technical amendment to the preamble in Federal Register / Vol. 59, No. 213 / Friday, November 4, 1994, page 55208.

How will OSHA assess a space which is entirely open on one plane, such as a pit, in determining whether a space has limited or restricted means for entry or exit?

In determining whether a space has limited or restricted means for entry or exit, OSHA will evaluate its overall characteristics to determine if an **entrant's ability to escape in an emergency would be hindered**. Thus, a pit, shaft or tank that is entirely open on one plane can be considered a confined space if the means for entering the space (stairway, ladderway, etc.) are narrow or twisted, or otherwise configured in such a way as to hinder an entrant's ability to quickly escape (See question No. 1 of this section). Similarly, the pit, shaft, or tank itself may be confining because of the presence of pipes, ducts, baffles, equipment or other factors which would hinder an entrant's ability to escape.

Reports of fatalities for CY17-19.

(The information is not comprehensive. We continue to update it as data becomes available).

Fatality summaries are listed in descending order from newest to oldest.

Date of Incident ▼	City ▲	Select State ⇅	Hazard Description ⇅	Inspection Number ⇅	Federal or State Plan ⇅	Citation Issued Related to Fatality ⇅
Date	City	Select State ▼	confine	Number	Select Category ▼	Select Yes or No ▼
05/05/2018	Salisbury	NC	Worker asphyxiated in confined space.	1314415	State	Yes
01/22/2018	Quinton	OK	Workers died in confined space fire.	1290639	Federal	Yes
12/15/2017	Valdosta	GA	Worker died of asphyxiation in confined space.	1284443	Federal	Yes
07/07/2017	Saipan	MP	Three workers asphyxiated from exposure to hydrogen sulfide gas in confined space.	1246546	Federal	Yes
02/03/2017	San Antonio	TX	Worker died from respiratory arrest after working in confined space.	1208199	Federal	No

Accident Investigation Summary

Summary Nr: 102574.015

Event: 01/22/2018

Three Employees Are Killed In Drilling Rig Explosion

At 8:37 a.m. on January 22, 2018, five employees were working on an oil rig, tripping out the wellbore to change a bit. During work, the gas surfaced as the pipe/bit was removed from the well, causing the well to burp. Once the initial burp subsided, another burp occurred and gas fumes found an ignition source, causing a series of explosions on and around the rig. Five employees were in the doghouse, unable to escape and were over come by smoke and excessive heat. Three employees were killed.

Keywords: smoke, gas well, explosion venting, heat, explosion, smoke inhalation

	Inspection			Degree	Nature	Occupation
1	1290639.015			Fatality	Burn/Scald(Heat)	Drillers, oil well
2	1290639.015			Fatality	Burn/Scald(Heat)	Occupation Not Listed
3	1290639.015			Fatality	Burn/Scald(Heat)	Occupation Not Listed

Accident Investigation Summary

Summary Nr: 97526.015

Event: 07/07/2017

Three Employees Are Asphyxiated By Hydrogen Sulfide Gas

At 11:00 a.m. on July 7, 2017, Employee #1 was attempting to dislodge a 24 inch rubber plug from a 2 foot diameter sewer pipe located inside a 24 foot deep wet well. The workers were outside the well pulling on a 1/4-inch nylon rope that was attached to the 24-inch diameter plug. The plug was lodged inside a T-shaped PVC fitting from the force of the waste water emptying into the well. Without conducting any atmospheric testing of the work space, Employee #1 climbed down the ladder with a crowbar to dislodge the deflated 24 inch diameter rubber plug, which was about 8 feet below the top of the well. He had difficulty releasing the plug with the crowbar and started to make his way up the ladder. He lost consciousness when he was about 2 feet from the top of the well and fell into the 24 foot deep well. Employee #2 descended down the ladder to provide emergency rescue, but lost consciousness and went underwater. The waste water level was about 3 feet deep at this point. Employee #3 climbed down the ladder to provide emergency rescue, but lost consciousness as well. All three workers were asphyxiated by hydrogen sulfide (H₂S) gas.

Keywords: asphyxiated, confined space, hydrogen sulfide

	Inspection		Degree	Nature	Occupation
1	1246546.015		Fatality	Asphyxia	Construction Laborer
2	1246546.015		Fatality	Asphyxia	Construction laborers
3	1246546.015		Fatality	Asphyxia	Construction laborers

Accident Investigation Summary

Summary Nr: 101665.015

Event: 12/15/2017

Employee Collapses In Oxygen Deprived Tanker Car And Is Kill

At 9:00 a.m. on December 15, 2017, an employee was cleaning the excess oil from the bottom of a tanker rail car following a previous application of oil to prevent corrosion. The employee collapsed due to a 98% atmosphere of nitrogen being present inside the tank car. The employee was killed due to asphyxiation.

Keywords: railroad tank car, tank cleaning, nitrogen, asphyxiated

	Inspection			Degree	Nature	Occupation
1	1284443.015			Fatality	Asphyxia	

Accident Investigation Summary

Summary Nr. 105566.015

Event: 05/05/2018

Employee Enters Oxygen Deficient Space And Is Killed

On May 5, 2018, Employee #1 was retrieving a plastic liner bag from a chemical container that had fallen into Reactor CP-2; a confined space. The permitting process, including air monitoring and setting up of ventilation, had not been conducted. As Employee #1 descended a ladder to access the reactor, he passed out at the first rung and fell to the bottom of the reactor. A coworker, who witnessed Employee#1 enter the space, contacted the control room to notify them of the incident. Emergency services were contacted and, upon arrival, recovered Employee #1 from the reactor. Employee #1 was determined dead. Air monitoring conducted by emergency services, following the incident, showed an oxygen concentration of eleven percent.

Keywords: oxygen deficiency, ladder, inhalation, fall, reactor, chemical vapor, emergency response, confined space

	Inspection			Degree	Nature	Occupation
1	1314415.015			Fatality	Asphyxia	Occupation not reported

Accident Investigation Summary

Summary Nr: 92877.015

Event: 02/03/2017

Employee Suffers Heart Attack While Using Respiratory Protec

At approximately 5:57 p.m. on February 3, 2017, an employee was working in the crawl space of Tower B to unclog food sink drains underneath the facility's kitchen. Workers were working in confined space in Mechanical Room Number 5. They were tasked to unclog four food drains which were located 50 to 60 feet from the confined space entrance. The employee exited the confined space before the two additional coworkers that were still working in the confined space. The employee sat on a bucket after exiting the confined space and began having trouble breathing and collapsed. Medical staff was called by BCSO maintenance technician and cardiopulmonary resuscitation was administered. The employee was transported to the Downtown Baptist Hospital and was pronounced dead at 7:31 p.m. During his work task, the employee was wearing a full Tychem suit, an N-95 respirator, rubber boots, headlamp, and a hardhat. An assessment was performed by the San Antonio Fire Department after the employee was removed from the area and 8.5 ppm Hydrogen Cyanide was detected in the room near the entrance of the confined space. The company did not have a respiratory protection program or confined space program. The autopsy findings indicated that the employee had a pre-existing health condition which could have been exacerbated by respirator use.

Keywords: ppe, respirator, confined space, cyanide, heart attack, chemical

	Inspection		Degree	Nature	Occupation
1	1208199.015		Fatality	Other	

Maine Roofing Contractor Faces \$1.7 Million in Fines and Manslaughter Indictment after Worker's Fatal Fall

OSHA QuickTakes, July 09, 2019 • Volume 18, Issue 12

- OSHA cited Shawn D. Purvis, owner of Purvis Home Improvement Co., Inc., for **egregious willful, repeat, and serious workplace safety violations** following the fatal **fall of a worker**. Inspectors found that the owner knowingly failed to ensure that his workers used fall protection at two worksites. Purvis faces a total of \$1,792,726 in penalties.
- On April 5, a grand jury **indicted Purvis for Manslaughter and Workplace Manslaughter**, charging that his repeated violations of OSHA's fall protection standards caused his worker's death.