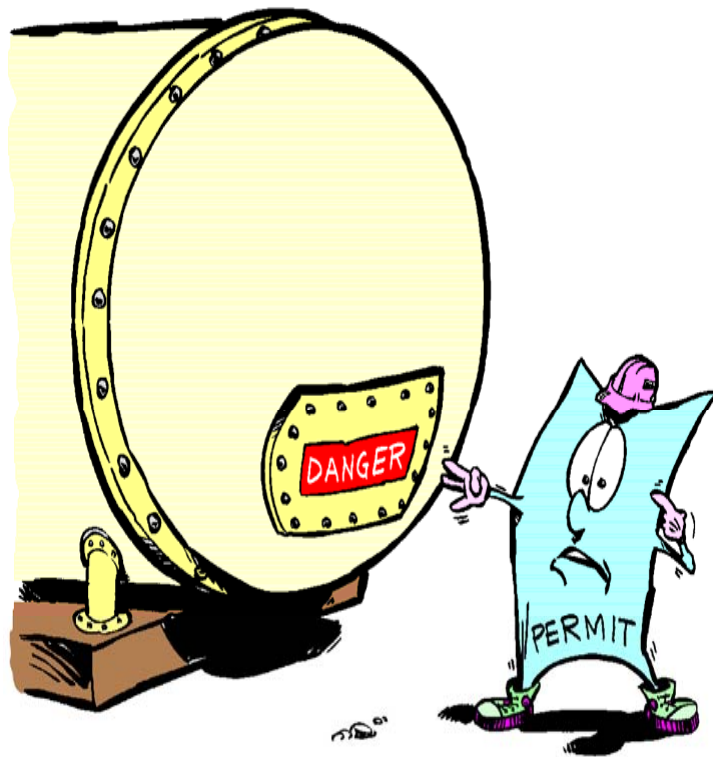


CONFINED SPACE /EXCAVATION SAFETY WORK PRACTICES



**Presented By: Aldane Stennett
PE REG# 02/0476**

**Wednesday 16.02.2011
JIE**

The Regulations

- Jamaica Factories Act:
 - The Jamaica Factories Regulations 1961
 - Regulation 30 *Working in Confined Spaces*
 - Regulation 32 *Steam Boiler-Being Inside*
 - The Building Operations and Works of Engineering Construction (Safety, Health & Welfare) Regulations, 1968.
 - PART VIII: Excavations, Shafts and Tunnels
 - PART:XIV Health and Welfare
- *Canada Occupational Health and Safety Regulations* PART XI-Confined Spaces
- Britain-The Confined Spaces Regulations 1997 *Statutory Instrument Regulations* 1997 No. 1713
- OSHA 29 CFR-1910.146 Subpart J-Permit-required Confined spaces-General Industry (1993)

The Regulations

- OSHA 29 CFR 1926.651 Subpart P – Excavations-construction Industry
- OSHA 29 CFR 1926.21 Subpart C-*Safety training and education*
 - specifies training for personnel who are required to enter confined spaces and defines a "confined or enclosed space."
- OSHA Confined Spaces in Construction [proposed rule](#) was issued Nov. 28, 2007 not yet promulgated
- OSHA 29 CFR 1926.800 Subpart S -Underground construction
 - Underground tunnels, shafts, chambers, and passageways..."
- OSHA 29 CFR 1926.956 Subpart V- underground electric transmission and distribution work
- ANSI Z117.1-1989, *Safety Requirements for Confined Spaces*.
 - Minimum safety for entering, exiting and working in confined spaces at normal atmospheric pressure.

What is a Confined Space?

OSHA's Definition

A space that:

1. Is large enough and so configured that an employee can enter bodily and perform work;
2. Has limited or restricted means of entry or exit;
3. Is not designed for continuous human occupancy.

IDLH

IMMEDIATELY DANGEROUS TO LIFE OR HEALTH

- Any condition that poses an immediate or delayed threat to life
- Causes irreversible adverse health effects
- Affects the ability of an individual to self-rescue

Examples of Confined Spaces:

- ◆ Tanks
- ◆ Manholes
- ◆ Boilers
- ◆ Furnaces
- ◆ Sewers
- ◆ Silos
- ◆ Hoppers



- ◆ Vaults
- ◆ Pipes
- ◆ Trenches
- ◆ Tunnels
- ◆ Ducts
- ◆ Condensers
- ◆ Pits
- ◆ Excavations

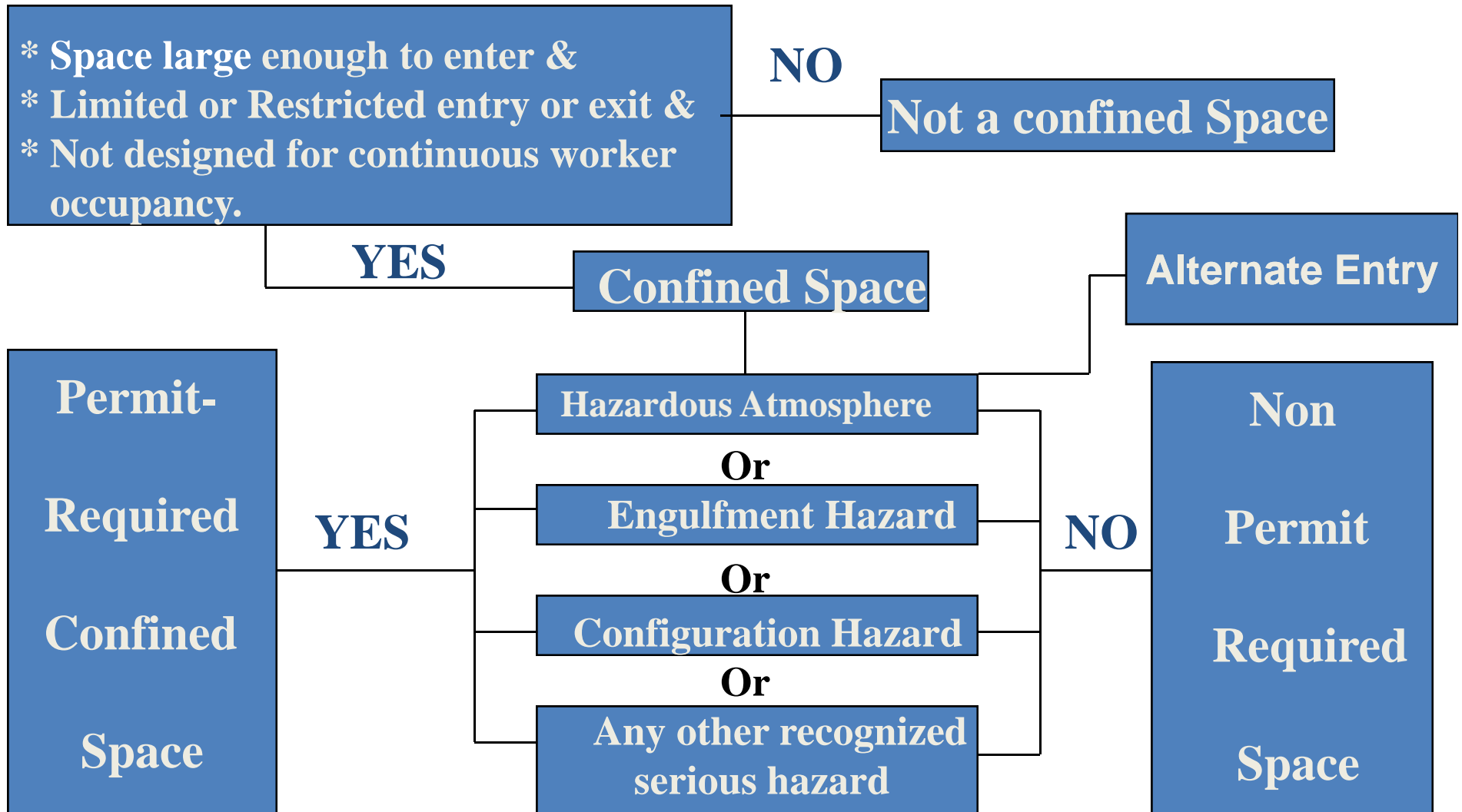
Confined Spaces Characteristics

- **Portal size.**
 - (a) **Restricted**--A portal of 24 inches or less in the least dimension. Provides rescue challenges.
 - (b) **Unrestricted**--A portal of greater than 24 inches in the least dimension. Allows Relatively free movement in and out of space
- **Space access.**
 - (a) **Horizontal**--The portal/opening is located on the side of the permit space.
 - (b) **Vertical**--The portal/opening is located on the top or bottom of the permit space. Requires Climbing down/Climbing up to access

Confined Spaces Characteristics

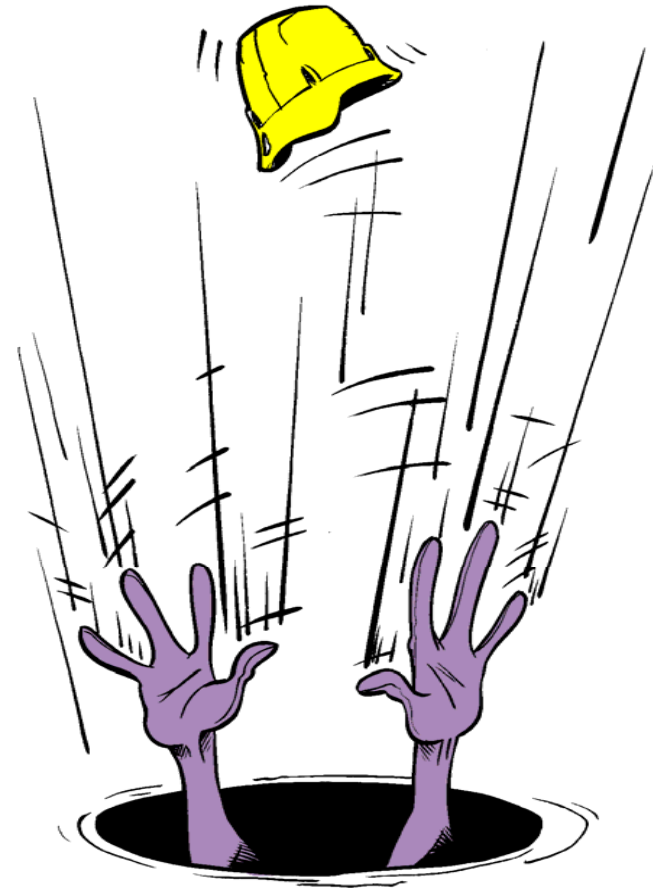
- **Internal configuration:**
 - (a) **Open**--there are no obstacles, barriers, or obstructions within the space.
 - (b) **Obstructed**--the confined space contains some type of obstruction by design or due to work practices.
- **Elevation:**
 - (a) **Elevated** -a permit space where the entrance portal or opening is above grade by 4 feet or more.
 - (b) **Non-elevated** -a permit space with the entrance portal located less than 4 feet above grade.

Categorizing Confined Space Work



ENTRY

- The act by which a person passes through an opening into a confined space.
- Any part of the body passing through the opening is considered entry.



CS Hazards

Potential Hazards

 Poor visibility \geq 5ft

- Electrical
- Mechanical
- Oxygen Deficiency: $O_2 < 19.5\%$
- Oxygen Enrichment $O_2 > 23.5\%$
- Combustible L.T. 10% LEL
- Toxic or poisonous substances
- Excessive depth & height

 Poor communication

- Environmental hazards
 - Temperature extremes
 - Noise & vibration
 - Airborne contaminant
- Sharp and protruding objects
- Personnel sickness
- Insects/allergic reaction/poisonous wildlife

Atmospheric Monitor Alarm Set points

Gas	Set Point	
Oxygen (O2)	Lower- 19.5%	Upper- 23.5%
Combustibles	10% LEL (Lower Explosive Limit)	
Carbon Monoxide (CO)	35 PPM	
Hydrogen Sulfide (H2S)	10 PPM	
Sulfur Dioxide (SO2)	2 PPM	
Ozone (O3)	0.1 PPM	
Ammonia (NH3)	25 PPM	
Other Toxic Gases	PEL (Permissible Exposure Limit)	

CONFINED SPACE ROLES

CS Entry Authority (Entry supervisor)

- **Competent Person who authorizes and manages confined space work and is responsible for:**
 - Ensuring written permit is in place
 - Ensuring Entry and rescue plan is in place
 - Determining if acceptable entry conditions exist
 - Authorizing entry
 - Overseeing entry operations
 - Terminating entry



Attendant (Hole Watch)

- **Attendant: The person who remains on the outside of the Space who shall not leave the space unless relieved and :**
 - **Monitors the entrant(s)**
 - **Guards the space against unauthorized entry**
 - **Warns the entrants of any unusual conditions**
 - **Summons the rescue personnel if needed**
 - **Performs non entry rescue technique**
 - **Monitor atmospheric condition**
 - **To keep records of confined space entry**
 - **Air test results**
 - **Personnel entry/exit**



Authorized Entrant

- Authorized Entrant :The person who will physically enter the confined space to perform work. The entrant has responsibility to:
 - Assure himself that the space has been adequately ventilated, isolated, emptied, or otherwise made safe for entry.
 - Immediately exit a space, without question, upon word of the attendant, no matter what the reason.
 - Follow all safety rules and procedures that apply to the job.
 - Be familiar with the work to be performed and the procedures that apply to the job.
 - Use the appropriate PPE as required



ATMOSPHERE TESTER

- The person who manages/test confined space air quality before and during entry. The atmosphere tester must:
 - Be trained in Confined Space Entry Procedure and atmospheric sampling techniques.
 - Know how to properly use air sampling equipment
 - Know how to perform calibration checks of air sampling equipment

NB: This role can be performed by any of the other trained confined space personnel so long as that person receives the atmosphere tester training

RESCUER/RESCUE OPERATIONS

ON-SITE RESCUE TEAM:

**Persons/employees on site
Trained, equipped and
assigned specific rescue
responsibilities.**

EXTERNAL RESCUE SERVICES:

**Non-employees contracted
to provide quick response to
Emergencies.
(E.g. Fire Dep't)**

CS Rescue Classification

- ***Self-Rescue:*** Entrants recognize exposure to an IDLH condition and escape from the space unaided and as quickly as possible.
- ***Non-Entry Rescue :***Equipment and other rescue aids are employed to assist in removing endangered entrants.
- ***Entry Rescue :*** Trained and equipped rescuers enters the space , package and retrieve the victim

Notes:

- IDLH ATMOSPHERE:
 - Rescue needed to be performed within 2-4 minutes
 - Best rescue team are persons onsite, trained equipped and assigned
- NON IDLH ATMOSPHERE:
 - Danger to entrants is restricted to mechanical hazards that would cause injuries (e.g., broken bones, abrasions)
 - Response time of 10 or 15 minutes might be adequate

CS NON ENTRY RESCUE EQUIPMENT

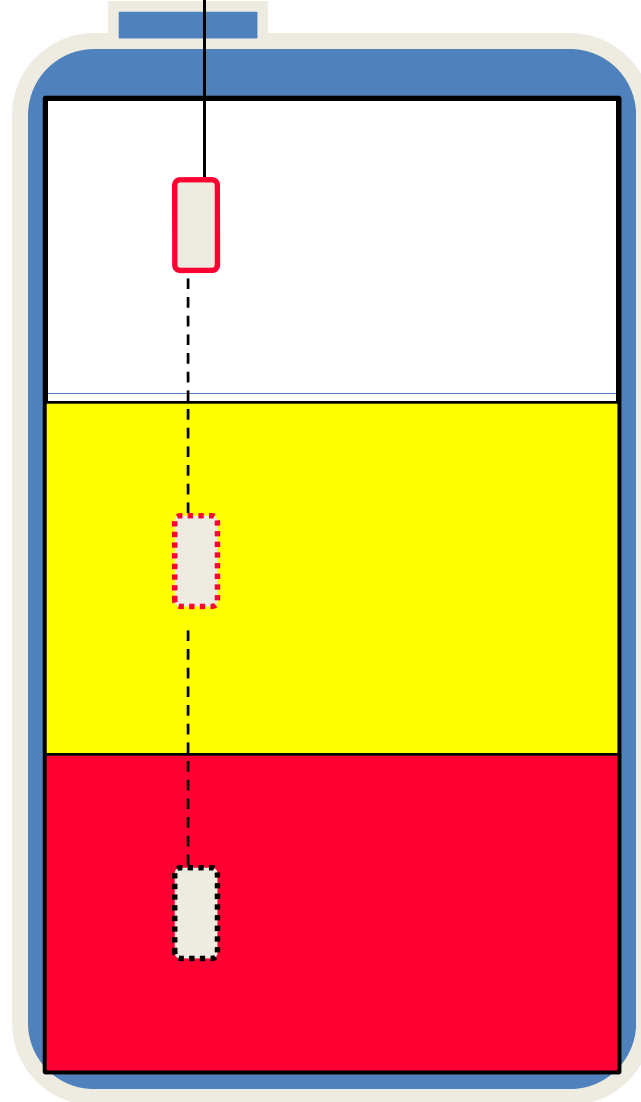
- To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant.
- A mechanical device for vertical confined spaces more than 5 feet deep. "Retrieval system" includes:
 - Retrieval line
 - Chest or full-body harness
 - Wristlets, if appropriate
 - Lifting device or anchor



Atmospheric Sampling

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

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



Good Air

Poor Air

Deadly Air

Atmospheric Sampling

1. Prior to every entry when the space is vacant
2. Continuously as long as a person occupies the space
 - Periodic reading must be documented on the CS permit form
3. Maximum sampling distance 100ft. with 1/8" Tygon or 3/8" Polyurethane tubing
4. 2 by 2 sampling rule
 - 2 seconds per foot (minimum requirement)
 - 2 minutes sample time (sensor response)
5. Confined Space sampling Top, Middle, Bottom & corner pockets (at a minimum, OSHA requires 4 ft. intervals)
6. Respiratory Protection maybe required for performing effective sampling

Confined Space

Purging and Ventilation Practices

- Purge times shall be sufficient to achieve seven (7) air changes in the confined Space
 - Ventilate naturally by opening up the space to create a natural draft
 - Use mechanical ventilation
 - Fans
 - Air horns
 - Ventilate at the rate of at least four (4) volumes per hour
 - Larger spaces require more ventilation
 - Make sure air supply is not contaminated
 - Ventilation air supply must be from fresh air uncontaminated with flammables, toxins, etc.
 - Welding operation-2000CFM per job in the space

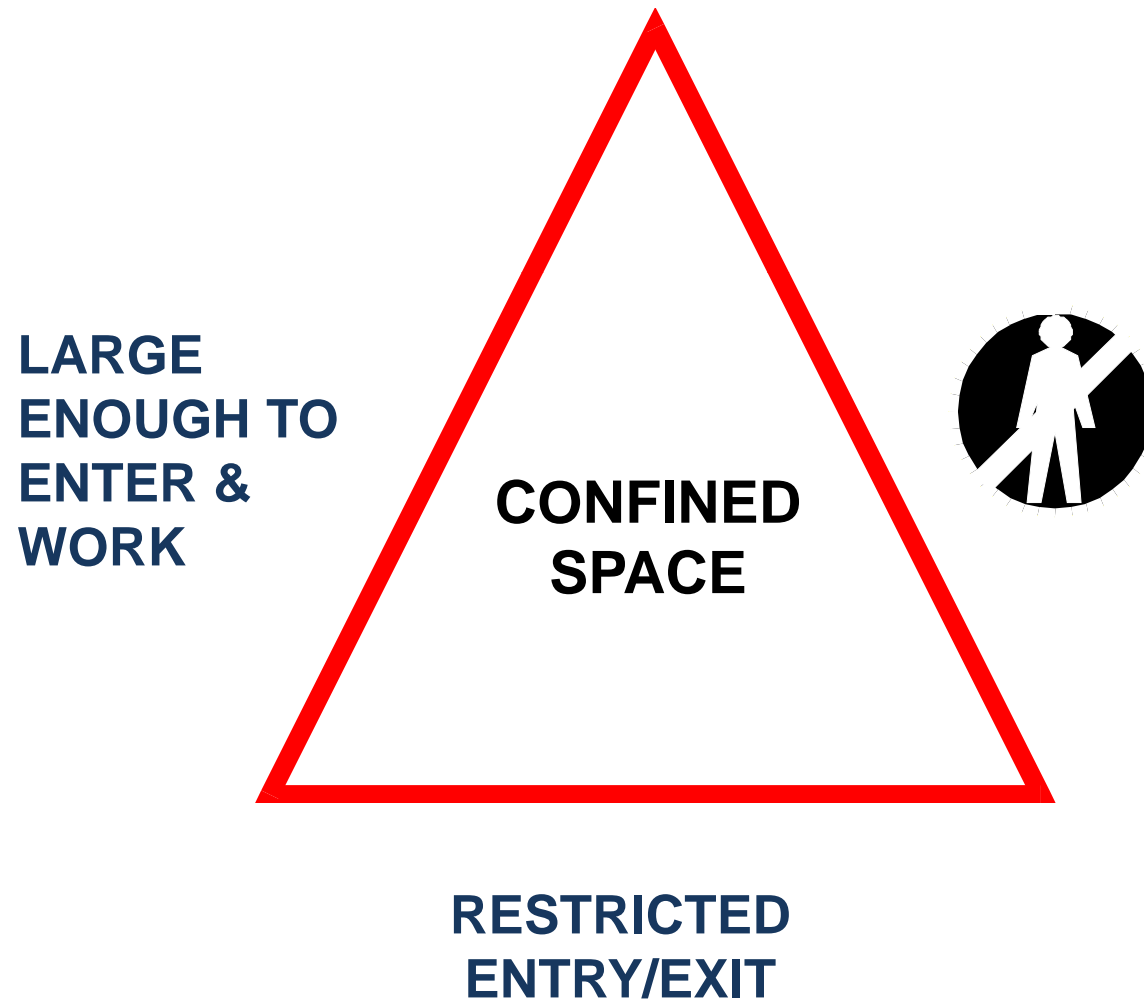
Symptoms of Exposure Toxic Atmosphere

- **HiDDeN**
 - o Headaches,
 - o Dizziness,
 - o Drowsiness, and
 - o Nausea.
- These may be remembered by the word HiDDeN. Drop the vowels and you have an acrostic with the first letters of the common symptoms of exposure

CS Safety Practice Summary

- Identify , evaluate, classify and label confined space
- Institute written permit system
- Institute worksite daily job briefing
- Train person in CS work practices
- Acquire the necessary PPE & equipment
- Develop Entry and rescue plan for each CS entry operation.
- Inspection & audit system for compliance
- Record keeping

Confined Space Triangle



General Reasons Why Workers Die in Confined Spaces

They:

- ◆ Do not _____ hazards
- ◆ Trust their _____
- ◆ _____ dangers
- ◆ Become _____
- ◆ Assume everything's _____
- ◆ Try to _____ a co-worker
- ◆ Take _____
- ◆ Assume _____ _____ has made the space safe

SAMPLE CONFINED SPACE PERMIT FORM

(1) LOTO #: <u>191110-05</u> Start date: <u>19/11/10</u> Start time: <u>7:00 pm</u> Expiration date: <u>19/11/10</u> Expiration time: <u>5:30 pm</u>												COMPLETE FOR CONFINED SPACE PERMIT REQUIRED ENTRY																							
(2) Confined Space Location/ID: <u>Blue New 110 tank</u> Sequential Entry Number:												(8) Rescue Requirements																							
(3) Work Scope: <u>CLEAN INTERIORS OF TANK</u>												<input type="checkbox"/> Non-Entry Rescue Equipment (Harness/Lifeline) <input checked="" type="checkbox"/> Mechanical Retrieval Device (Required for vertical entries over 5 feet where non-entry equipment is used)																							
(4) POTENTIAL HAZARDS (Check all that apply)												Rescue Service Providers																							
Atmospheric Hazards 1 <input checked="" type="checkbox"/> Oxygen Deficient/Enriched 2 <input checked="" type="checkbox"/> Flammable/Explosive 3 <input checked="" type="checkbox"/> Toxic 4 <input type="checkbox"/> Irritant						Non-Atmospheric Hazards 5 <input checked="" type="checkbox"/> Thermal (Hot/Cold) 6 <input checked="" type="checkbox"/> Mechanical 7 <input type="checkbox"/> Electrical 8 <input type="checkbox"/> Fall 9 <input type="checkbox"/> Equipment						10 <input checked="" type="checkbox"/> Entrapment 11 <input type="checkbox"/> Hazardous Chemical 12 <input type="checkbox"/> Falling Object 13 <input type="checkbox"/> Radiation 14 <input type="checkbox"/> Other Serious Safety						<input type="checkbox"/> In-house Rescue Team Names: <u>M. WELINGTON</u> <u>L. HUTCHINSON</u> <u>H. ELLIS</u> <u>N. MULLER</u> Outside Rescue Service Names:																	
(5) HAZARD CONTROL/ELIMINATION METHOD												Means of Rescue Team Notification <input checked="" type="checkbox"/> Rescue Plan Reviewed Rescue Service Notification (Date/Time) <u>19/11/10 - 8:00 am</u> <input type="checkbox"/> Rescue Service Availability Verified Anticipated Response Time:																							
Hazard <u>1</u> Description of Method Used <u>CONTINUOUS VENTILATION</u> Controlled <input type="checkbox"/> Eliminated <input type="checkbox"/> <u>2</u> <u>CONTINUOUS VENTILATION / MONITORING</u> <input type="checkbox"/> <input type="checkbox"/> <u>3</u> <u>JOB BRIEFING</u> <input type="checkbox"/> <input type="checkbox"/> <u>4</u> <u>HARNESSES / RESCUE PLANS</u> <input type="checkbox"/> <input type="checkbox"/>												(6) ENTRY/PERIODIC ATMOSPHERIC TESTS RESULTS																							
Required	Gas	Limits	Initial Testing	Verification Sample	Subsequent Entry	Subsequent Entry	Subsequent Entry	Subsequent Entry	Subsequent Entry	Subsequent Entry	Subsequent Entry																								
	Date/Time <u>19/11/10</u>		<u>8:00</u>	<u>9:00</u>	<u>10:00</u>																														
	OXYGEN (O2)	19.5%-23.5%	<u>21.5%</u>	<u>21.5</u>	<u>21.5</u>																														
	LOWER EXPLOSION LIMIT (LEL)	<10%	<u>0</u>	<u>0</u>	<u>0</u>																														
	Carbon Monoxide (CO)	<35 PPM	<u>0</u>	<u>0</u>	<u>0</u>																														
	Hydrogen Sulfide (H2S)	<10 PPM	<u>0</u>	<u>0</u>	<u>0</u>																														
	Sulfur Dioxide (SO2)	<2 PPM	<u>0</u>	<u>0</u>	<u>0</u>																														
	Ammonia (NH3)	<25 PPM	<u>0</u>	<u>0</u>	<u>0</u>																														
	OZONE (O3)	<0.1 PPM	<u>0</u>	<u>0</u>	<u>0</u>																														
	Other Toxic	<PEL																																	
Testing Conducted By: <u>S. WILLIAMS & N. GRANT</u> Monitor Serial #: <u>0610086001</u> Calibration Date: <u>19/11/2010</u> Bump Tested Satisfactory: <u>YES</u>												(10) Attendants																							
* Required for Alternate — Entry to Demonstrate the adequacy of Ventilation												Name (Print) Initial Time Initial Time Initial Time Initial Time Initial Time Initial Time Initial Time Initial Time Initial Time Initial Time <u>M. Hodge</u> <u>M.H.</u> <u>7:00</u>																							
(7) ENTRY REQUIREMENTS												(11) Current Confined Space Authority																							
<input type="checkbox"/> LOTO issued/signed on <input type="checkbox"/> Low Voltage Lighting <input type="checkbox"/> Hot Work Permit <input checked="" type="checkbox"/> Means of Communication <input type="checkbox"/> Ground Fault Circuit Interrupter												<input checked="" type="checkbox"/> Purge Space Prior to Entry <input type="checkbox"/> Natural Ventilation <input checked="" type="checkbox"/> Continuous Forced Ventilation <input checked="" type="checkbox"/> Continuous Atmospheric Monitoring <input checked="" type="checkbox"/> Personal Atmospheric Monitoring												<input type="checkbox"/> Respirators <input type="checkbox"/> Protective Clothing <input type="checkbox"/> Eye/Face Protection <input type="checkbox"/> Hand/Arm Protection <input type="checkbox"/> Hearing <input type="checkbox"/> Other Permits											
Non-Permit												Alternate-Entry												Permit Required											
<input type="checkbox"/> Complete sections 1-7 All atmospheric and non-atmospheric hazards in the Confined Space listed above have been eliminated and the space is hereby classified as Non Permit Confined Space.												<input type="checkbox"/> Complete sections 1-7 All of the non-atmospheric hazards in the CS listed above have been eliminated and the atmospheric hazards can be controlled by continuous forced air ventilation only. This space is hereby classified as Alternate-Entry Confined Space.												<input type="checkbox"/> Complete sections 1-12 Atmospheric or non-atmospheric hazards cannot be eliminated and the confined space is hereby classified as Permit Required Confined Space.											
CONFINED SPACE AUTHORIZATION I have reviewed the requirements listed on this entry form for work described in section (3), determined the classification, and discussed expectations with the Entry Personnel. This entry form is only valid for the work listed. The space must be re-evaluated if conditions change. Post this confined space entry form at the job site. If the confined space has been classified as Permit Required, entry is only authorized for the duration of the job or one working shift, whichever is shorter. Confined Space Authority Signature: <u>[Signature]</u> DATE <u>19/11/10</u>												I have reviewed the requirement listed on this entry form for work described in section (3) and hereby declare that I am aware of entry into the space mentioned in section (2) Shift Charge Supervisor Signature: <u>[Signature]</u>												I have received a briefing by the previous Confined Space Authority and understand the information contained on this Confined Space Entry Form TIME ON DUTY TIME OFF DUTY TIME ON DUTY TIME OFF DUTY											
CONFINED SPACE CLOSING All work detailed above and the Confined Space Entry is complete. All applicable parts of the Confined Space Entry Form must be completed to be valid. Post the Entry Form at the confined space during the job. Forward the closed Entry Form to the Safety Department. Confined Space Authority Signature: <u>[Signature]</u> DATE/TIME OF COMPLETION:												All work detailed above and the Confined Space entry is complete. All applicable parts of the Confined Space Entry Form must be completed to be valid. Post the Entry Form at the confined space during the job. Forward the closed Entry Form to the Safety Department. Confined Space Authority Signature: <u>[Signature]</u> DATE/TIME OF COMPLETION:												(12) Problems encountered during confined space permit required entry operation and corrective actions taken.											

EXCAVATION SAFETY

Excavation Definitions

- Excavation – a man-made cut, cavity, trench, or depression formed by earth removal.
- Trench – a narrow excavation. The depth is greater than the width, but not wider than 15 feet.
- Shield - a structure able to withstand a cave-in and protect employees
- Shoring - a structure that supports the sides of an excavation and protects against cave-ins
- Sloping - a technique that employs a specific angle of incline on the sides of the excavation. The angle varies based on assessment of impacting site factors.
- "Competent person" -one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them

Competent Person

- Qualifications
 - Knowledge of soils and soil classification
 - Understands design and use of protective systems
 - Ability to recognize and test hazardous atmospheres
 - Documented training
 - Prior excavation experience

Excavation Inspections

- Daily Inspections of ALL excavations by Competent Person (Jamaica: at least every 7 days)
 - Start of shift, as needed, following rainstorms or other hazard-increasing event
 - Possible cave-ins
 - Protective system failure
 - Water accumulation
 - Hazardous atmospheres
 - Competent person has authority to remove workers from the excavation



STOP WORK AUTHORITY!!!

OSHA Construction Soil Classification

- Solid Rock:
 - “Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed”
- Type A Soil:
 - Cohesive soil with an unconfined, compressive strength of 1.5 Tsf
 - Examples of this type of soil are clays, silty clay, sandy clays, and clay loam.
- A Soil is NOT type ‘A’ IF:
 - The soil is fissured
 - The soil is subject to vibration
 - The soil has been previously disturbed
 - The material is subject to other factors that would require it to be classified as a less stable material.
 - Water is present

OSHA Construction

Soil Classification Cont'd

- Type B Soil:
 - Cohesive soil with an unconfined compressive strength greater than 0.5 Tsf
 - Granular cohesionless soils including; silt, silt loam, sandy loam, and some sandy clay loam
 - Previously disturbed soils except those which would otherwise be classified as Type 'C' soil
- Type 'C' Soil:
 - Cohesive soils with an unconfined compressive strength of 0.5 Tsf or less
 - Granular soils including gravel, sand, and loamy sand
 - Submerged soil, or soil from which water is freely seeping

Excavation Hazards

- Surface encumbrances
- Utilities
- Access/Egress
- Vehicle traffic
- Falling loads
- Mobile equipment
- Hazardous atmospheres
- Water accumulation
- Adjacent structures
- Loose rock or soil
- Falls
- Cave-in

Access/Egress

- Note: Poor housekeeping --- # 1 cause of slips, trips and falls on construction projects
 - Debris kept cleared from work areas
 - Mark hazards
 - Barricade or cover holes
- Egress provided-
 - 25' travel distance
 - ladders
 - ramps
 - stairs



Vehicle Traffic

- Traffic Control
- Traffic Safety Vests



Exposure to Falling Loads

- No work under loads
- Operators remain in cab
- Seat belt use



Mobile Equipment

- Warning system
 - Barricades
 - Hand signals
 - Mechanical signals
 - Stop logs
 - Grade away from excavation



Hazardous Atmospheres

Test @ 4' if suspected

- LEL
- Oxygen
- CO
- H2S
- Petroleum
- Other toxics



Ventilation

- Displace hazardous gases and vapors
- Considerations
 - Heavier than air or lighter than air contaminant
 - Exhausting or blowing in
 - Volume/time required to lower concentrations to acceptable levels



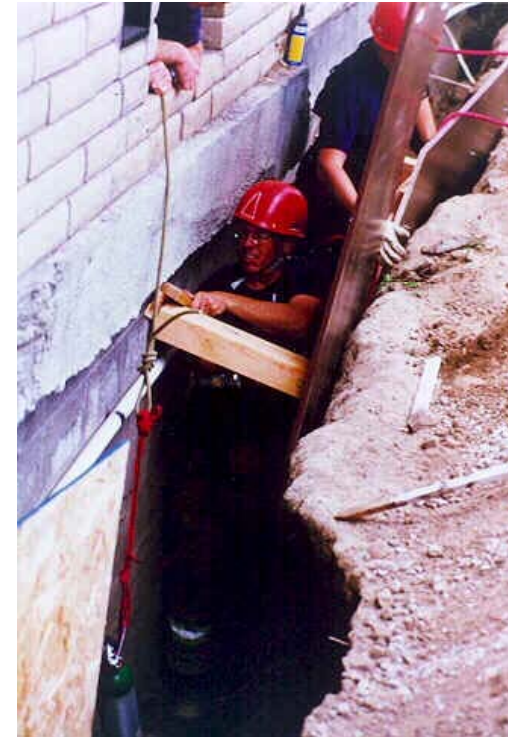
Water Accumulation



- Protection from hazards associated with water accumulation
 - Protection against cave-in
 - Water removal (pumping)
 - Run-off protection
 - Consider temporary shut-off of water lines
- Drowning /engulfment Hazard

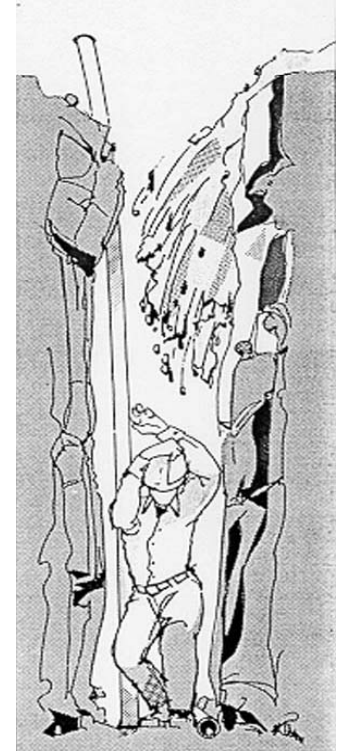
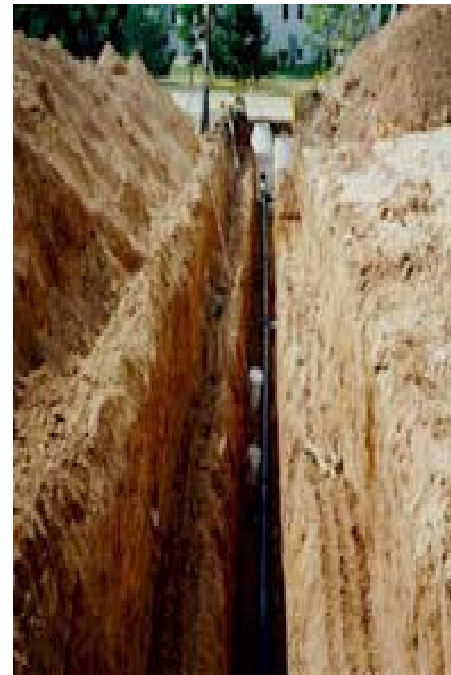
Adjacent Structures

- Ensure structure stability
 - Shoring
 - Bracing
 - Underpinning
 - Or evaluation by P.E.



Loose Rock and Soil

- Protection of employees from loose rock or soil
 - Scaling –remove loose rocks from the faces
 - Protective barriers
 - Placing material at least 2' from edge
 - No work on slopes above workers



Fall Protection

- Any surface 6 feet or more above a lower level shall be protected by:
 - walkways with guardrail systems
 - personal fall arrest systems
- Other options include:
 - warning lines systems
 - safety monitoring systems



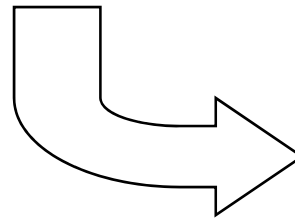
Nb: Jamaica Factories act: 6'6"

Cave-in

- Protection from cave-in requires a systematic approach including:
 - Soil classification
 - Protective systems
 - Inspection
 - Employee training



An oh
sh_t!

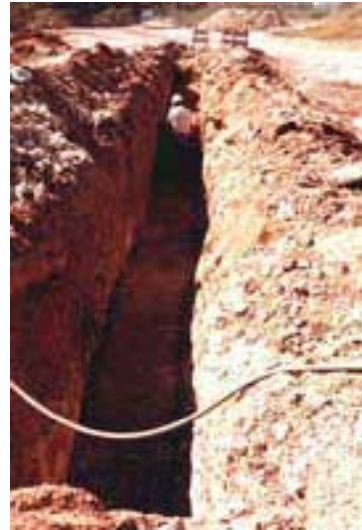


Protective Systems

- Required unless:
 - Excavation in stable rock
 - Excavation less than 5 feet and examination by Competent Person determines no potential for cave-in

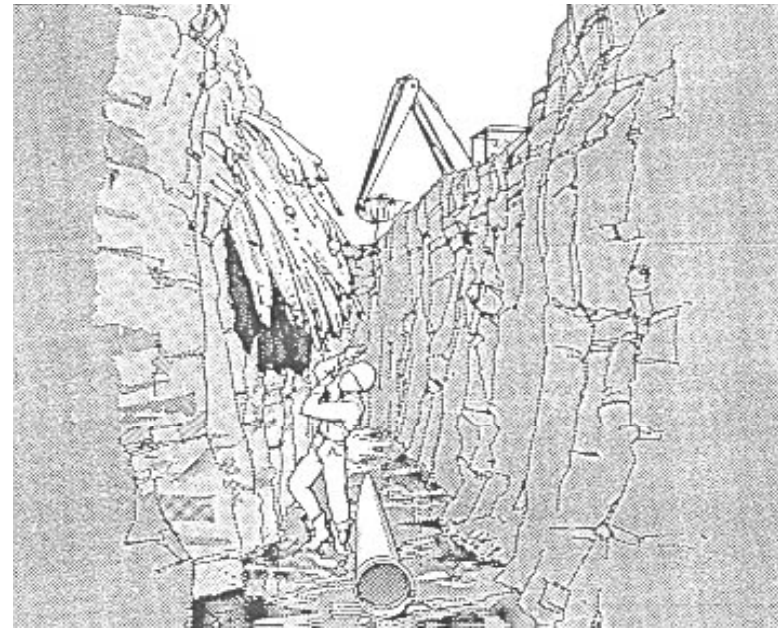


- YO!



Protective Systems

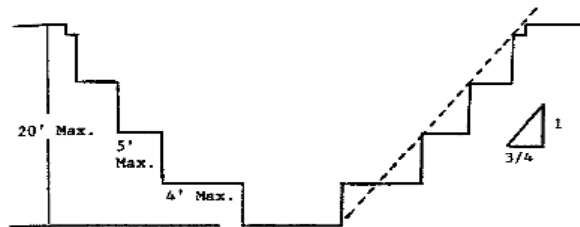
- Options Include:
 - Sloping and benching
 - Shoring/sheet piling/shielding (e.g. trench boxes)
 - Timber
 - Aluminium
 - Designed by P.E. if deeper than 20'



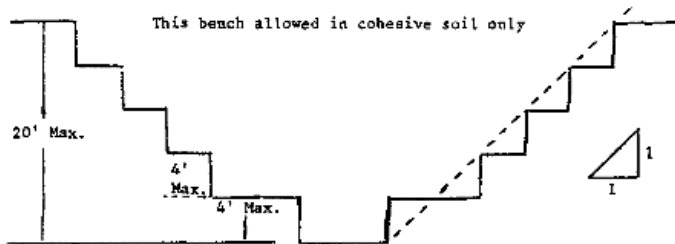
Sloping/ Benching

Benching

- Type A



- Type B
– (cohesive soil)



- Type C

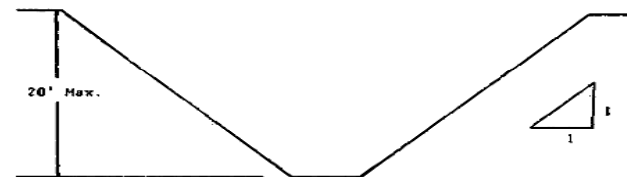
NA

Simple Sloping

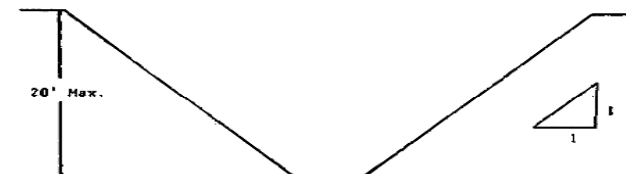
- Type A - 3/4:1



- Type B - 1:1



- Type C - 1½:1



Shields (i.e. Trench Boxes)

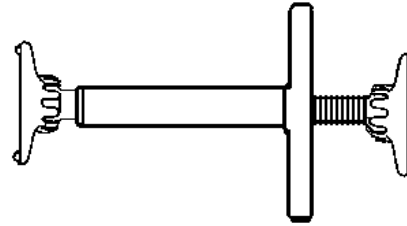


Figure 3. Trench Jacks (Screw Jacks)

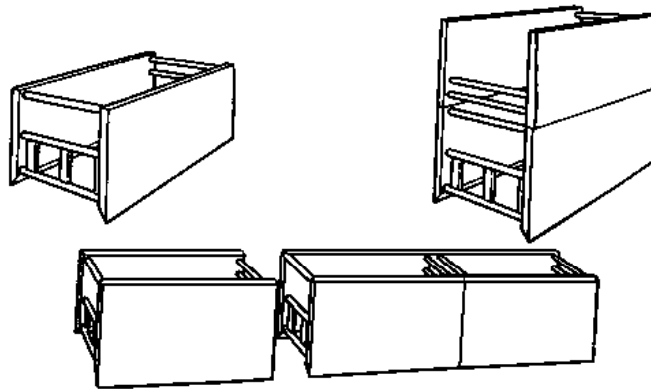


Figure 4. Trench Shields

Protective Systems

- ***Installation***

- ***Securely connected***
- ***Employees clear of area under shields during installation***
- ***Installed to prevent movement***
- ***Must protect employees while entering excavation***



- ***Removal***

- ***Employees clear of area under shields during removal***
- ***Shoring removed from the bottom up, SLOWLY!***
- ***Backfill with removal***



Safe Distances Overhead Power Lines

VOLTAGE	MINIMUM DISTANCE FROM INSULATED LINES
Less than 300 Volts	0.9 m (3 Ft.)
300 Volts to 50 KV	3.05 m (10 Ft.)
More than 50 KV	3.05m(10Ft)plus1cm(0.4 Inch)/each 1KV
VOLTAGE	MINIMUM DISTANCE FROM UNINSULATED LINES
Less than 50 KV	3.05m (10 Ft.)
More than 50 KV	3.05m(10Ft)plus1cm(0.4 Inch)/each 1Kv

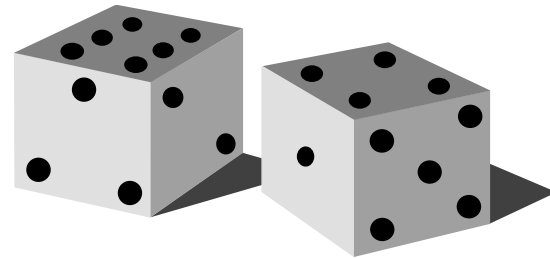
Underground Power lines

- Contact utility before digging
- Maintain a minimum clearance of two (2) feet between a marked and unexposed underground facility and the cutting edge or point of any power operated excavating or earth moving equipment.
- Treat all buried line/equipment as energized, until a qualified worker from the utility says differently.
- If electrical equipment is damaged during the trenching or excavating operations, consider this equipment to be energized until properly disconnected, tested and grounded.

Excavation Rescues

- The best rescue is the one you never have to make!
 - Practice proper procedures
 - Make sure everything is safe before anybody goes in!

DON'T ROLL THE DICE!!!

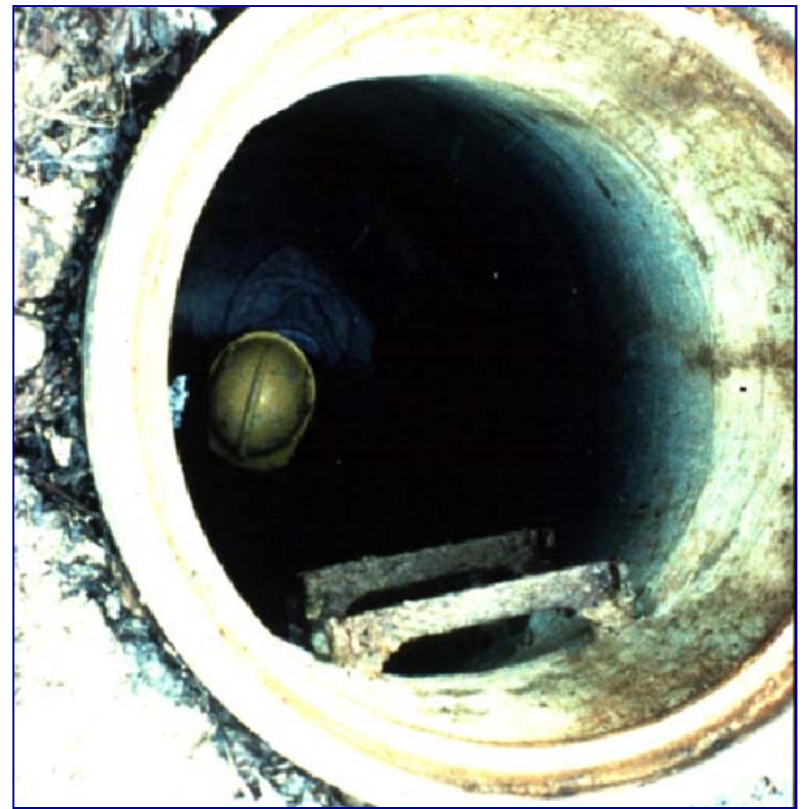


END

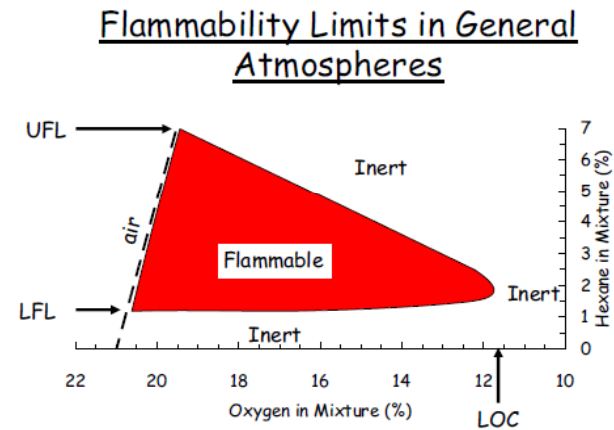
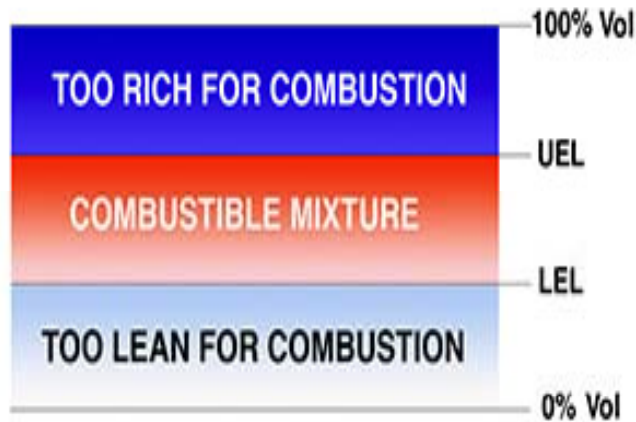
The Headlines

- Article February 27,2007 concrete mixer crushes man: A family is mourning the loss of their beloved relative after he died in hospital on Sunday from [injuries](#) he sustained inside a mechanical concrete [mixer](#) at Newport West in Kingston.
- Article date February 9, 2009. One dead, another injured in freak accident A 62-year-old man was killed and another man injured in an incident at a excavation site at Hollywood in Mammee Bay, St Ann.
- Article Thursday, September 16, 2010: Farm workers died from 'environmental suffocation. Two Jamaicans were employed at Canadian apple farm.
- Article Date November 12, 2010: Workers killed in trench cave-in: Tragedy struck at a construction site on Barbican Road in St Andrew yesterday afternoon, leaving two workmen dead and another hospitalized.
- Article December 30, 2010 Manchester mishap - Ten-year-old drowns in community tank
- Article January 17, 2011 sad end for brothers-drowned in 15ft deep soak away pit in Manchester.
- Article November 8,2010: Resident protest boy's drowning death-8feet deep 30 “ pipeline hole

One confined space is safe; the other one
will kill you in less than 1 minute.
“Do you feel lucky?”



EXPLOSION LIMIT DIAGRAM

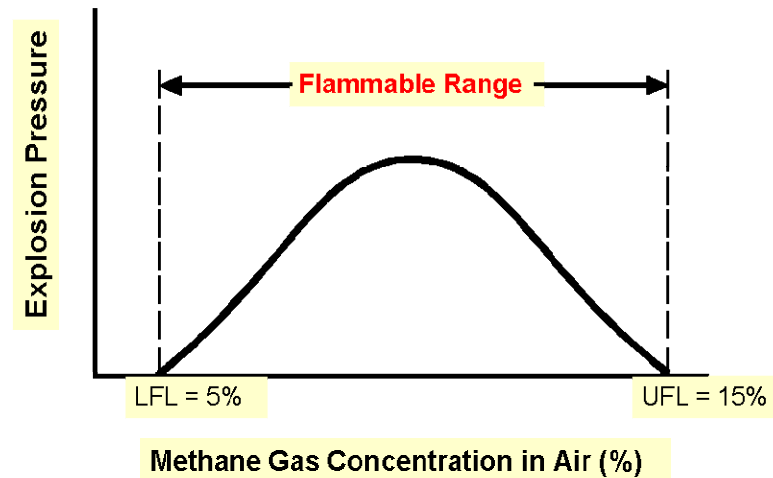


6/21/2007

Flammability

5

Flammable Range for Methane



Temperature Extremes

- **Progression of hyperthermia(ambient heat stress)**
 - Core body temperature should be less than 38 Deg C (100.4F),
 - Body temperatures above 40 °C (104 °F) are life-threatening.
 - Heat Stroke at 41 deg C (105.8F) brain death begins
 - at 45 °C (113 °F) death is nearly certain
 - Internal temperatures above 50 °C (122 °F) will cause rigidity in the muscles and certain, immediate death
 - Heat stroke may come on suddenly, but usually follows a less-threatening condition commonly referred to as heat exhaustion or heat prostration
- **Hypothermia**
 - Mild-97-93F
 - Moderate-93-90F
 - Severe-90F-82F
 - Critical<82F