New Jersey State Police
HAZMAT RESPONSE UNIT

CONFINED

SPACE

AWARENESS

06047

- *Whether you are assessing a medical emergency, fire, haz. mat. incident, confined space or other incident,*

- *Common factors that have resulted in a:*

F.A.I.L.U.R.E.

F.A.I.L.U.R.E.

- **F**ailure to understand or underestimate the environment.
- **A**dditional medical implications not considered.
- **I**nadequate rescue skills
- **L**ack of team work and or experience.
- **U**nderestimating the logical needs of the operation.
- **R**escue vs. Recovery mode not considered.
- **E**quipment not mastered.

Course Description

- ***Confined Space Awareness is the entry level of the confined space training program and the continuation of the hazardous materials training.***

- ***This course is open to any individual and designed to acquaint the individual with the basic and essential information of confined space entry.***

New Jersey State Police /HMRU

Course Listing

- **First Responder Awareness 4 hrs. 4 CEU**
- **First Responder Operations 8 hrs. 8 CEU**
- **EMS Operations 8 hrs. 8 CEU**
- **Haz. Mat. Technician 80 hrs. 24CEU**
- **EMS Advanced 8 hrs. 8 CEU**
- **On Scene Commander 24 hrs. 16 CEU**
- **Confined Space Awareness 4 hrs. 4 CEU**
- **Confined Space Operations 16 hrs. 16 CEU**

NJSP/HMRU Confined Space Awareness

Table of Contents

Overview

- What are the problems ?
- What if any , are the hazard faced ?
- Are the hazards different ?
- Why do we need them ?
- Does every Dept. need a team ?
  - Do we/can we really do this type of work?
  - Should we ? and if we can't - where can we get help from ?

Overview-Hazards Within

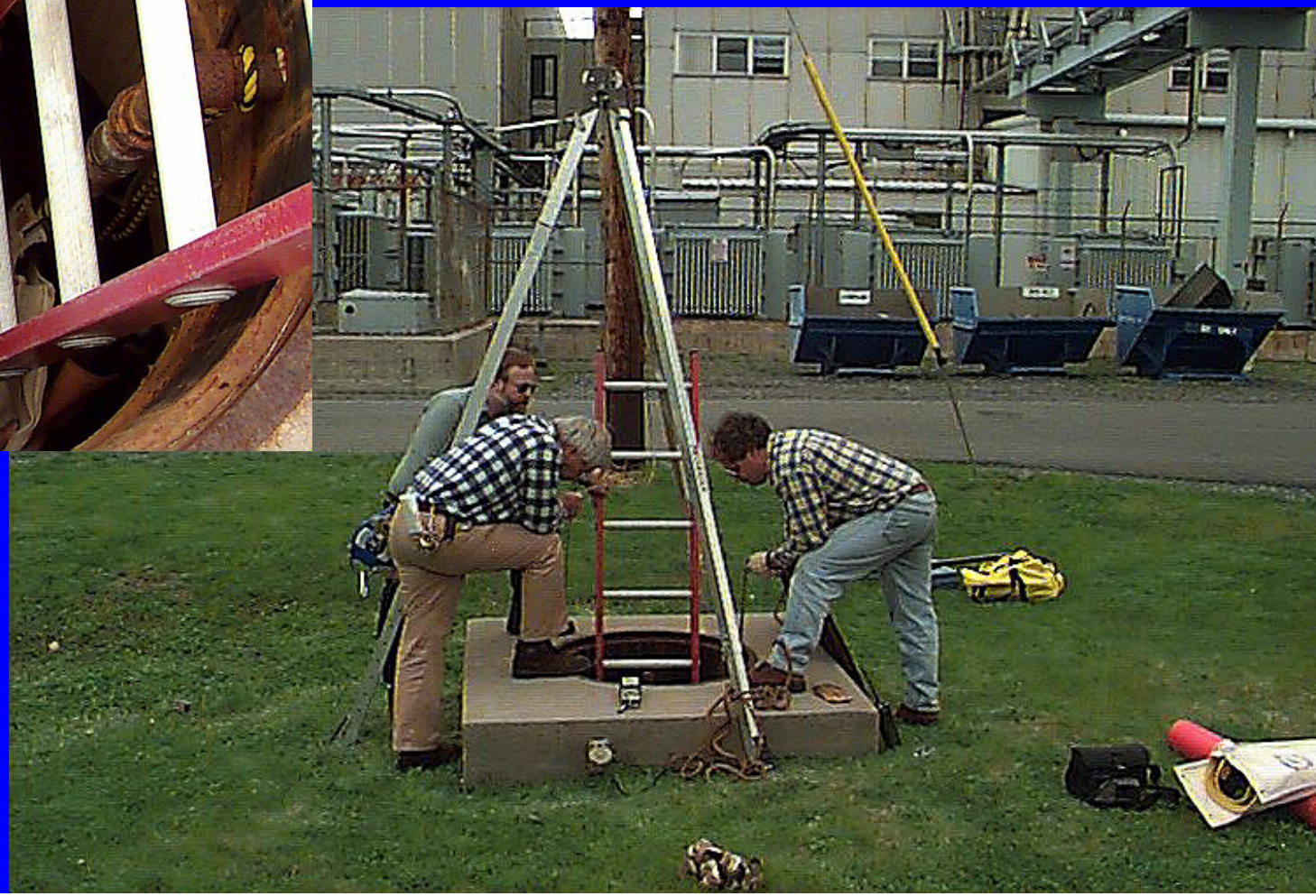
- Limited access
- Hazardous atmospheres (poisons, toxic,oxygen deficient/displaced or flammable
- Energy Sources
- Mechanical equipment
- Internally small and confining
- Unstable walls or converging
- Engulfment hazard

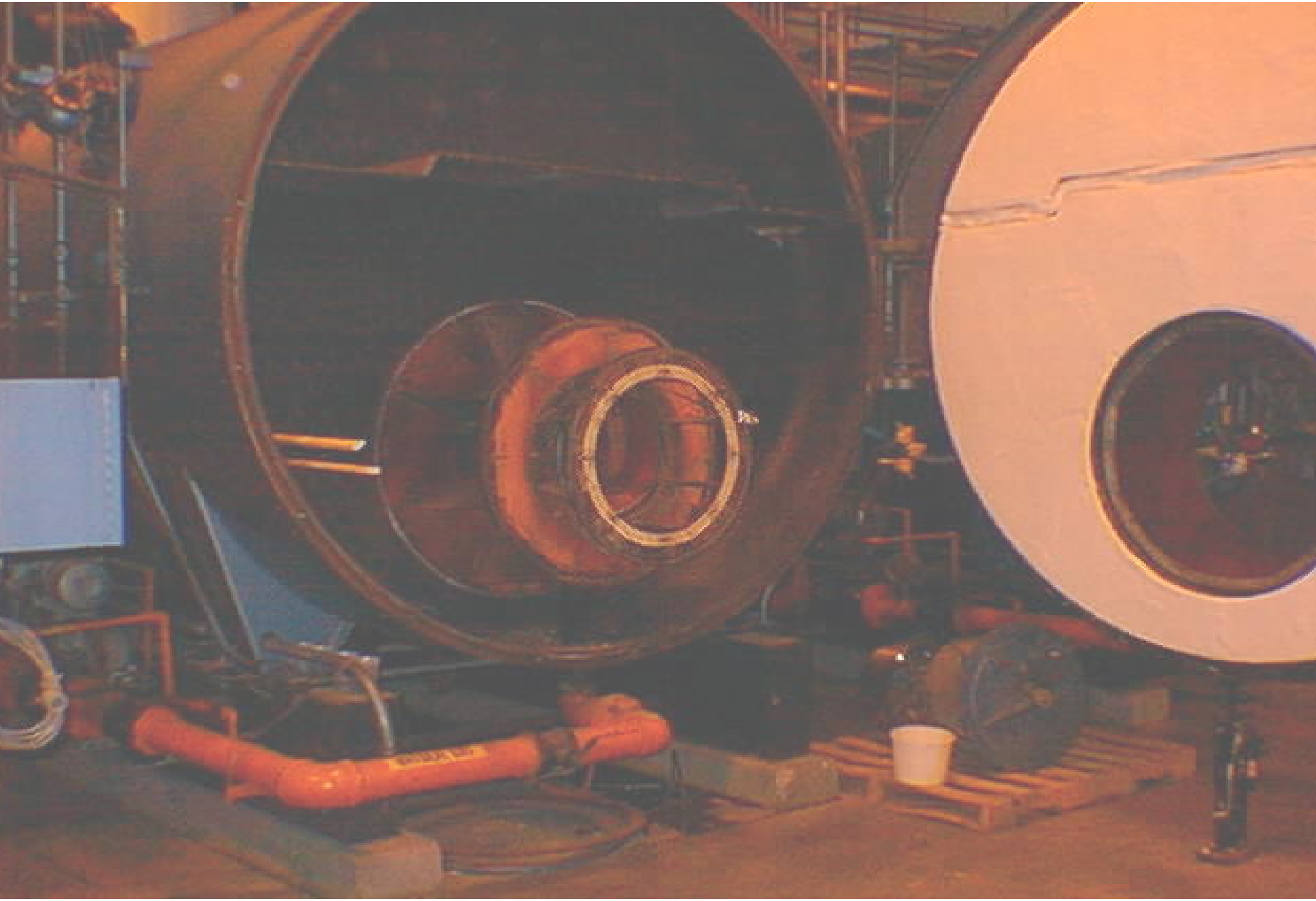
NJSP/HMRU Confined Space Awareness

Overview-Hazards Within

- Unexpected introduction of materials through uncontrolled openings.
- Biologics
- Poor lighting
- Residues

NJSP/HMRU Confined Space Awareness



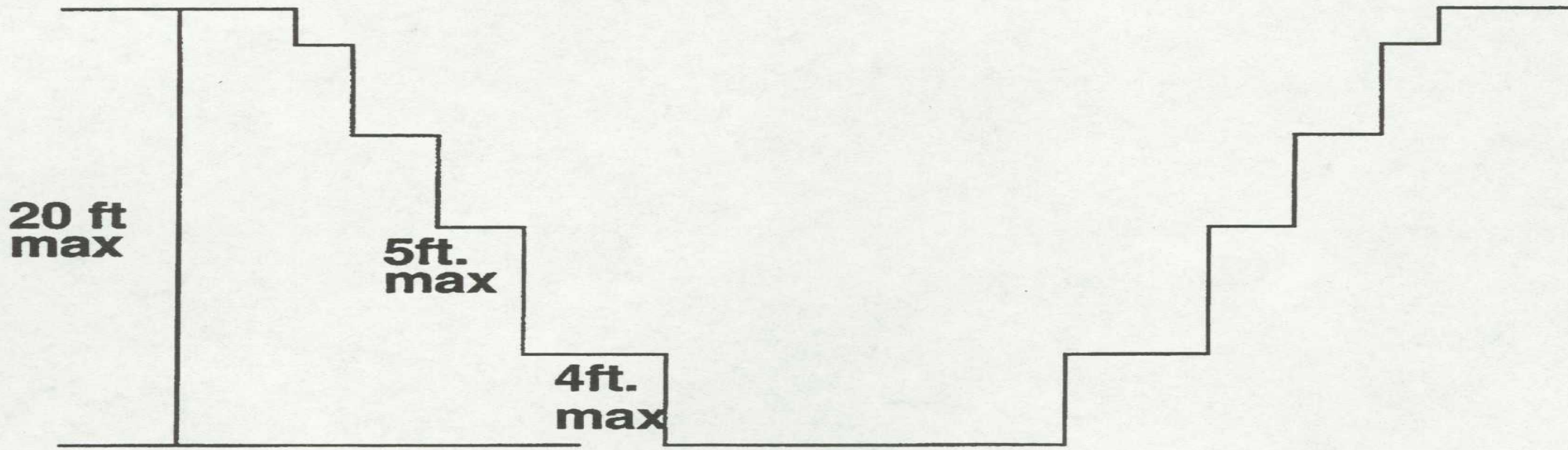


INTRO TO TRENCH OPS.

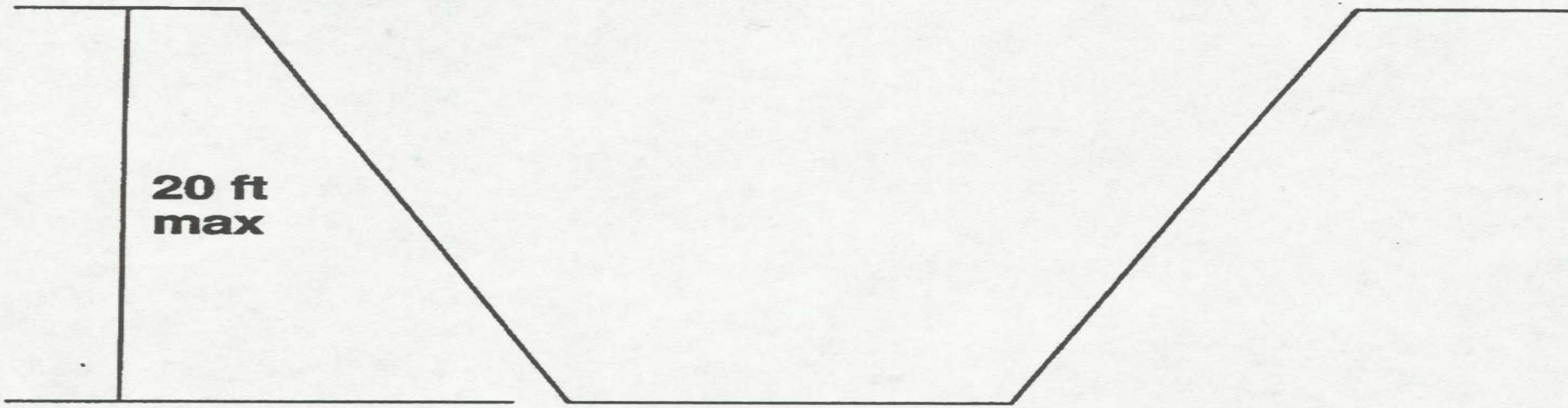
TRENCH OPS

- SLOPING OR BENCHING
- SHIELDING
- SHORING
- ANYTHING DEEPER THAN 20 FEET MUST BE AN ENGINEERING SYSTEM

BENCHING



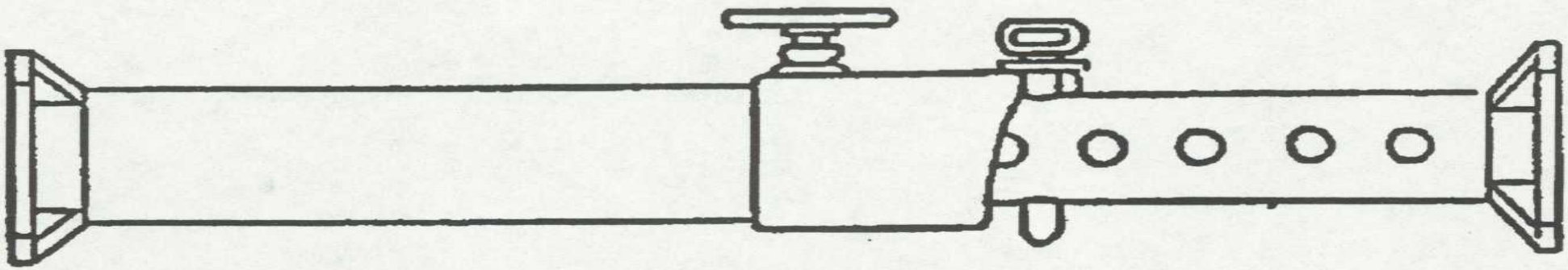
SLOPING



VICTIM EXTRICATION

- Stabilize trench 1st.
- Remove soil restricting breathing ASAP
- Uncover victim COMPLETELY before extricating.
- Do not use power equipment or spade shovels near victim
- Minimize time spent on patient treatment in trench.
- Remove victim using appropriate method.
- Never compromise rescuer safety.
- Leave shoring in place if removal is hazardous.

SHORING



Who’s Responsibility is it to check ?

Use of Proper shoring at construction sites

TRENCH PADDING

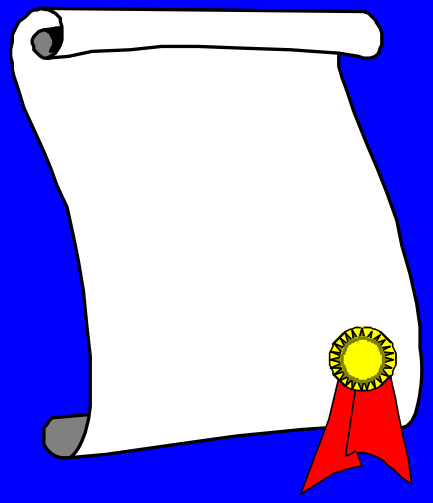
TRENCH -FIN FORMS

AIR STRUTS

NJSP/HMRU Confined Space Awareness

Vocabulary

- **Appendix A:** Guidance Documents
- **Appendix B:** Confined Space Accidents
- **Appendix C:** Glossary
- **Appendix D:** NJAC Regulations
- **Appendix E:** NIOSH/OSHA Standards



OBJECTIVES - Legal Standards

- Identify the two legal standards that require confined space training.
- Identify which of the two standards affects them directly.
- Identify at least two guidance documents that will help them plan confined space work.

Module 1

Regulatory Standards

- PUBLIC SECTOR - PEOSHA N.J.A.C. 12:100-9
- PRIVATE SECTOR -OSHA 29 CFR, 1910.146

Guidance Standards

- **ANSI** Safety for Confined Spaces - Z117.1
- **NIOSH** Working in Confined Spaces & A Guide to Safety In Confined Spaces.
- **NSC** National Safety Council

Module 2

Module 2

CONFINED SPACE IDENTIFICATION & RECOGNITION OF HAZARDS

- Confined Space Recognition.
- Confined Space Hazards.
- Chemical & Toxicological Terms.
- Common Gases & Vapors.

Module 2

OBJECTIVES - Recognition

- Identify a confined space
- List at least four physical hazards associated with confined spaces.
- Demonstrate an awareness of the chemical hazards likely to be encountered in a confined space and their impact on worker safety.
- Define the terms vapor density, lower explosive limit, PEL and IDLH and describe the impact each of them may have on an entry.
- Describe the purpose of the confined space permit.
- Describe the duties of attendants and supervisors in confined space .

NJSP/HMRU Confined Space Awareness

Module 2

What is a confined space ?

- Septic tanks
- Reaction tanks
- Pressure vessels
- Sewage digesters
- Sewers
- Silos
- Storage tanks
- Ship holds
- Vaults & Vats
- Trenches / excavations
- Pits
- Pumping stations
- Pipelines
- Boilers
- Cupolas
- De-greasers
- Furnaces

Module 2

Recognition (N.J.A.C. 12:100-9)

- **PEOSHA - NJ** *defines that a confined space is space which by design has:*
  - ***Limited openings for entry and exit.***
  - ***Unfavorable natural ventilation.***
  - ***Could contain a hazardous atmosphere.***
  - ***Is not intended for continuous employee occupancy.***

Recognition (29 CFR 1910.146(b))

- OSHA-US defines confined spaces both permitted & non-permitted which as enclosed spaces:
  - **Are large enough and so configured that an employee can bodily enter and perform assigned work.**
  - **Have limited or restricted routes of entry or exit.**
  - **Are not designed for continuous employee occupancy.**

Module 2

OSHA-US additional has a PERMIT REQUIRED *(29 CFR 1910,146 (b))*

- *Has, or has the potential, for one or more of the following (four) characteristics:*
  - ***A hazardous atmosphere.***
  - ***An engulfment hazard.***
  - ***An internal configuration that could trap or asphyxiate an entrant, such as inwardly converging walls, a downward sloping floor that tapers to a smaller cross-section.***
  - ***Any other recognized serious safety or health hazard.***

Permitted vs Non-Permitted

- **Permitted**
  - *Those functions or operations which require a permit to enter to be issued by the Authority Having Jurisdiction (AHJ).*

- **Non-Permitted**
  - *Those functions or operations which do not require a permit to enter.*

Module 2

- ***NIOSH*** *Recommends that confined space be defined as:*
  - *A work space normally enclosed by design, like storage tanks and shafts.*
  - *A work space that is enclosed by its configuration in design or construction, like pipe runs and ventilation ducts.*
- ***National Safety Council***
  - *Uses the OSHA definition but adds that a confined space is any open surface tank or pit deeper than four (4) feet.*

Confined Space Hazards

- Limited Access - 18-27 inch openings
- Existing or Potential Atmospheric Hazard.
- Poisoning from toxic gases or vapors
- Asphyxiation
- Energy Sources
- Explosion
- Mechanical Equipment
- Small internal dimensions
- Lack of communications
- Unstable walls or converging
- Falling Objects
- Critters
- Poor lighting
- Biologic's

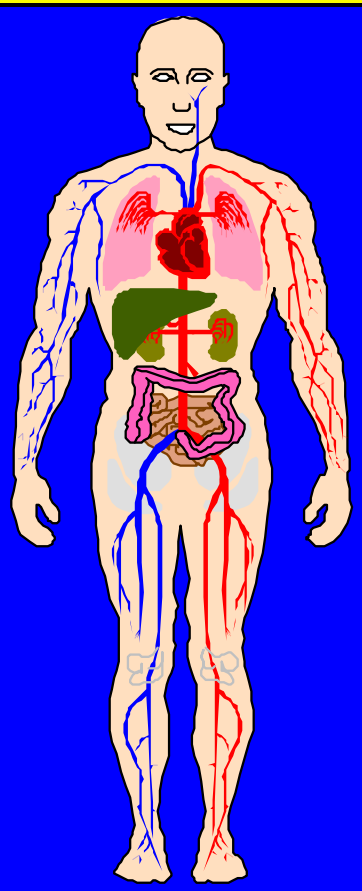
Chemical Related Hazards

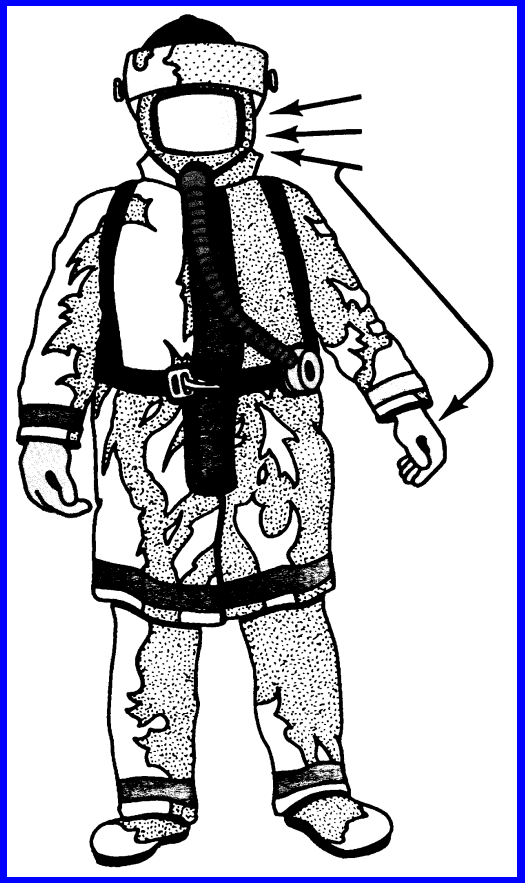
- Residue of previous stored products.
- Unexpected leaks or spills within space.
- Unexpected introduction of materials through uncontrolled pipes, inlets or other openings.
- Unexpected chemical reactions within the space.
- By-products of Operations
- Poor ventilation and /or Inerting.

Module 2

Methods of Entry into the body:

- Inhalation
- Ingestion
- Skin Absorption
- Injection





Module 2- Effects

- Acute - Chronic
- Immediate - Delayed
- Local - Systemic

Module 2

TERMS

- Permissible Exposure Limit (PEL)
- Threshold Limit Value (TLV)
- Recommended Exposure Limit (REL)
- Time Weighted Averages (TWA)
- Immediately Dangerous to Life & Health (IDLH)
- Short Term Exposure Limit (STEL)
- Short Term Lethal Concentration. (STLC)
- Explosive Range
  - LEL(LFL) ----- UEL(UFL)
- Flash Point Temperature

TERMS

- ***Permissible Exposure Limit (PEL)***

  The Permissible Exposure Limit (PEL) is the average concentration of a substance (determined by OSHA) in which the average worker can work 8 hr.day, 40 hrs./wk, over a working lifetime. This is Dose received averaged over Time of Exposure.

Module 2

Threshold Limit Value (TLV)

The Threshold Limit Value (TLV) determined by ACGIH, is the recommended average air concentration of a substance in which the average worker can work for an 8 hr. work day without ill effects.

TERMS

- **Recommended Exposure Limit (REL)**

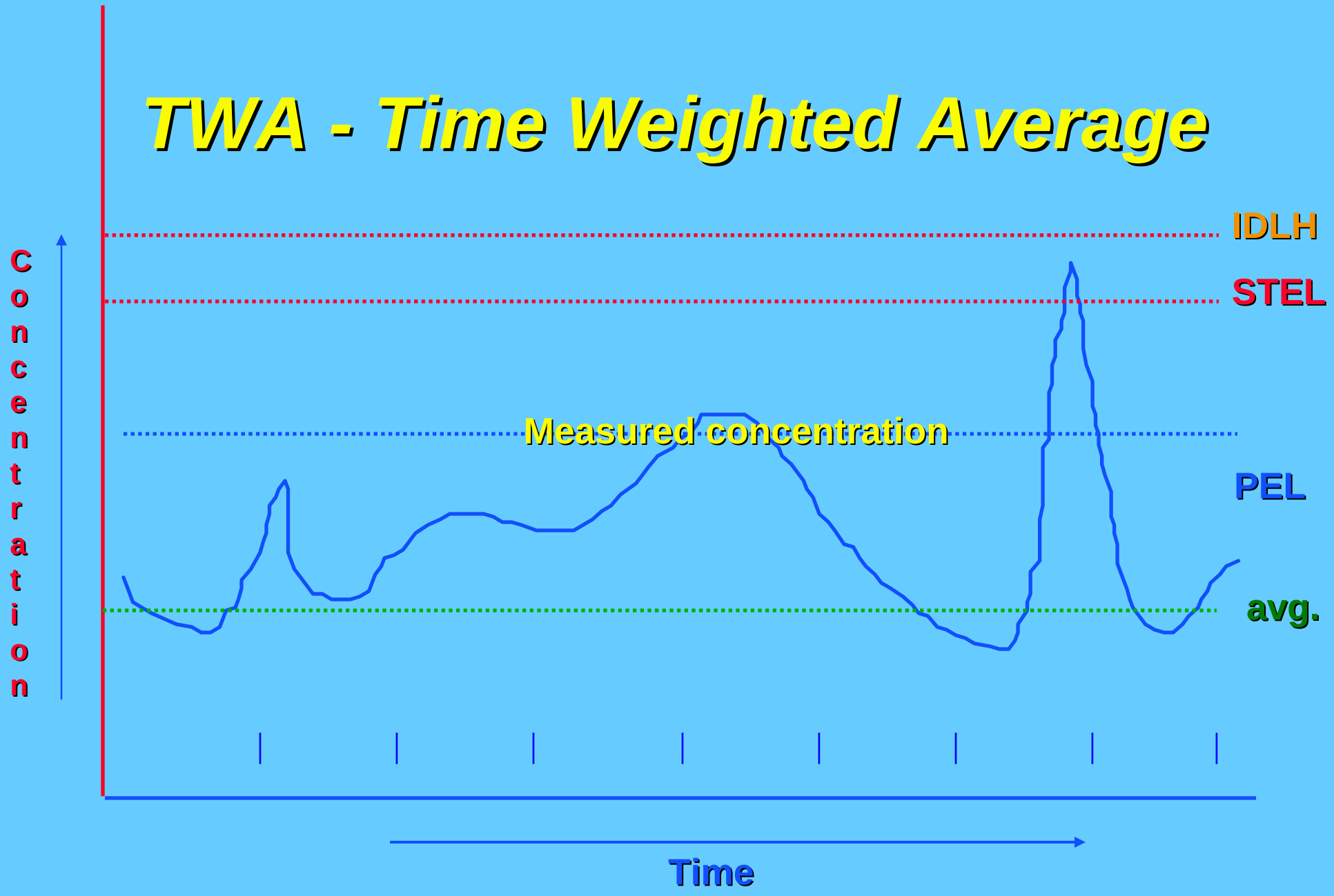
The Recommended Exposure Limit (REL) is the average concentration of a substance (determined by NIOSH) in which the average worker can work 8hrs/day, 40 hrs./wk, over a working lifetime.

Module 2

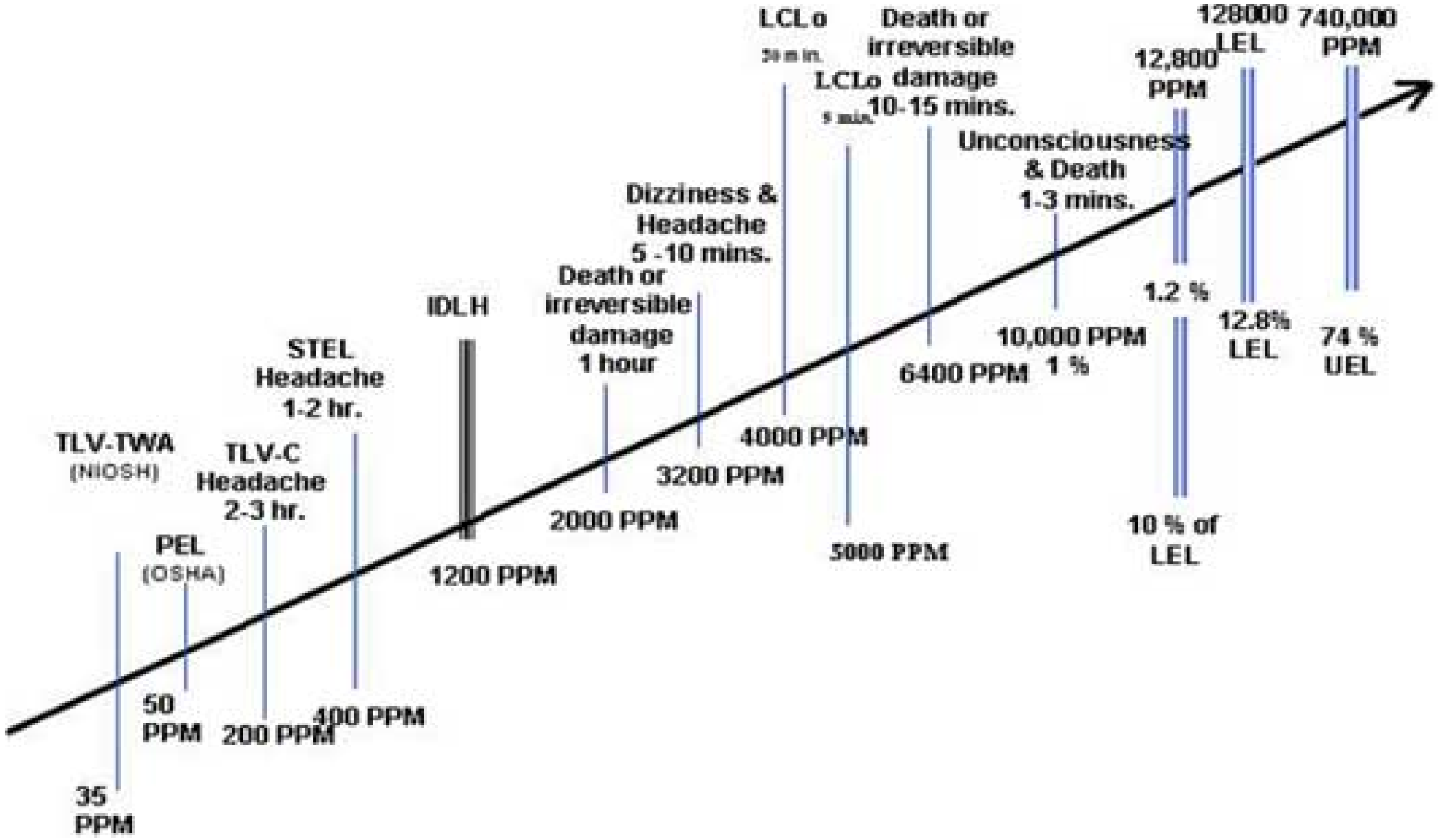
- ***Time Weighted Averages (TWA)***

- *PEL's, REL's and TLV's are all TWA - That is dose received divided by the time of exposure. The TWA is commonly calculated for an eight (8) hr. day and 40 hr. work week. PEL's are law. REL's & TLV are recommendations (guidance)*

TWA - Time Weighted Average



Carbon Monoxide co



Module 2

TERMS

- ***Immediately Dangerous to Life & Health (IDLH)***
  - ***A IDLH concentration is the concentration of a material which will, immediately, produce irreversible health effects (even death).***

Module 2

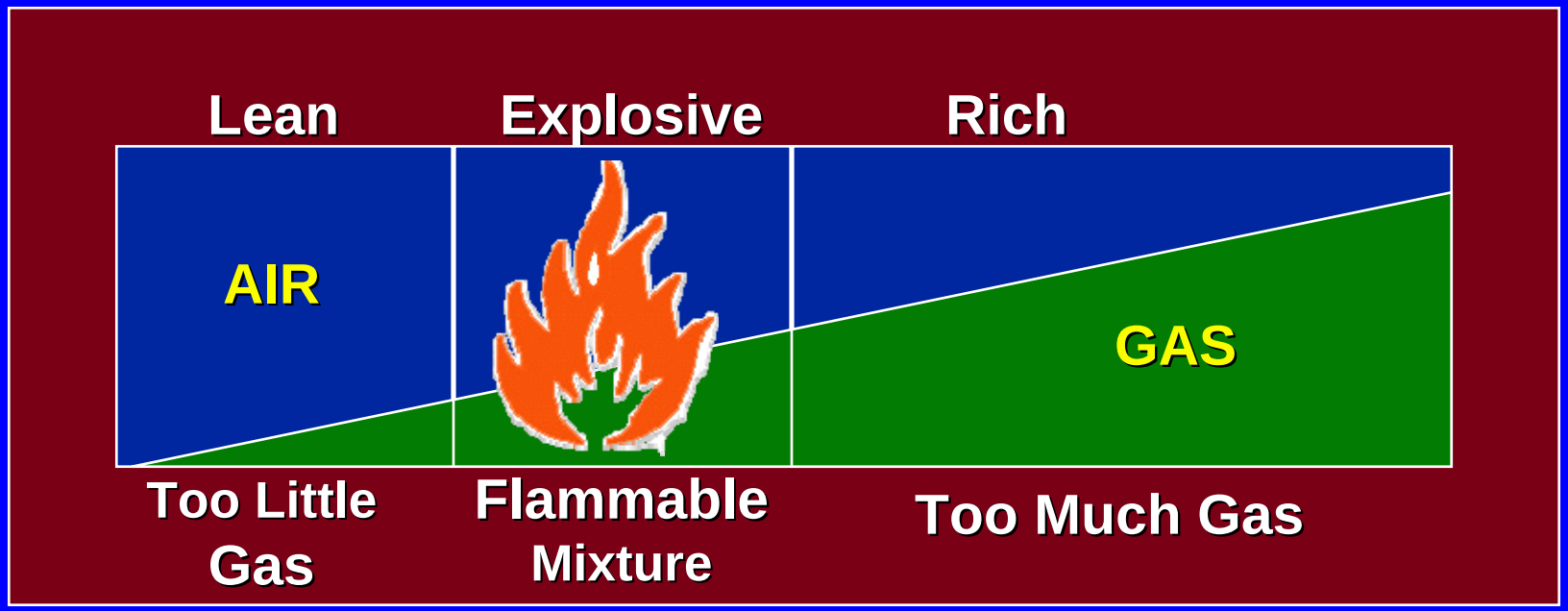
- **Short Term Exposure Limit (STEL)**
  - Is the level of a material that the average worker can be exposed for short periods of time (15 minutes) four (4) times daily allowing one hour recovery between exposures with no permanent ill effects.

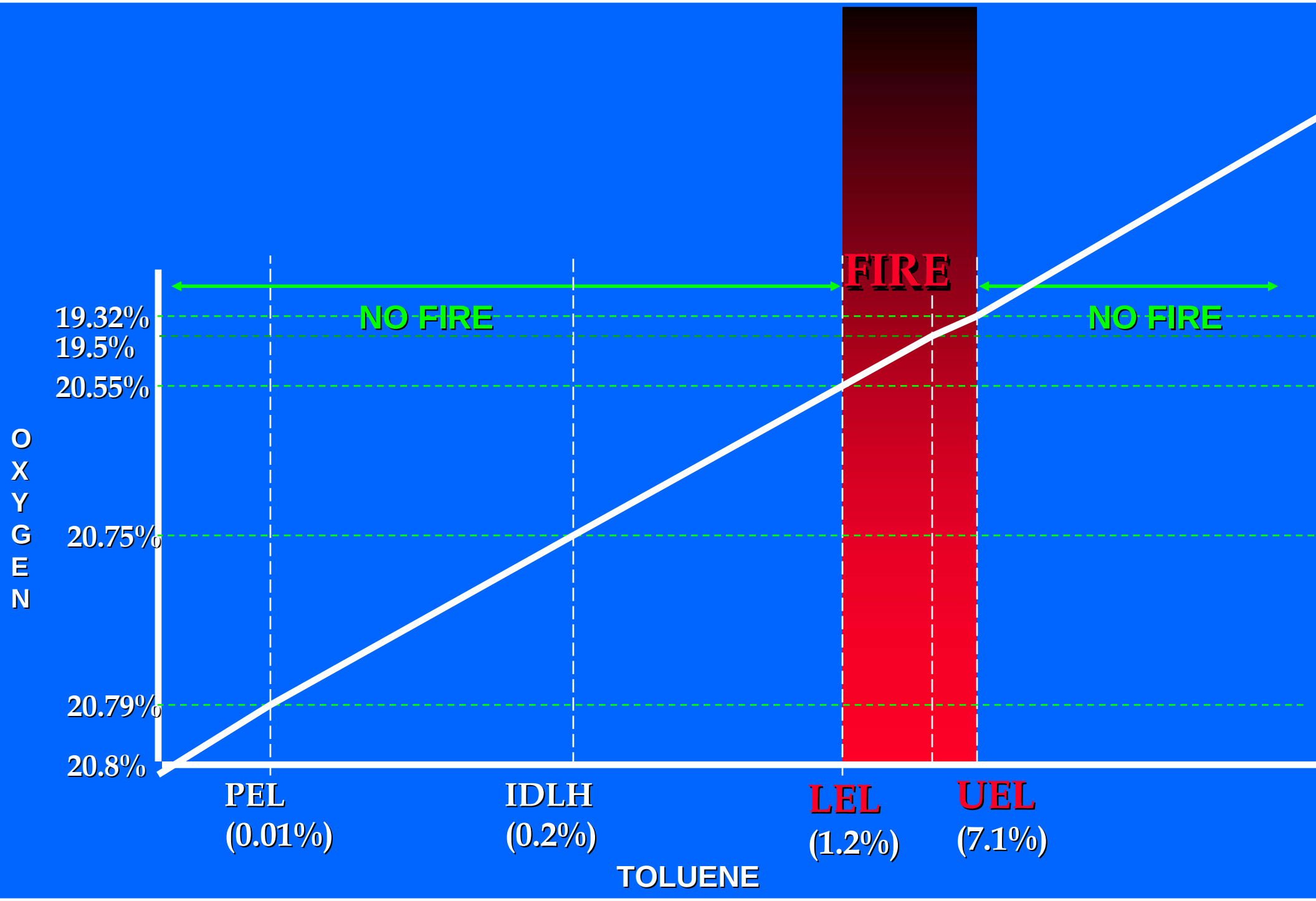
TERMS

- ***Short Term Lethal Concen. (STLC)***
  - ***Is the concentration of a materials that will kill the average worker in 10 minutes of exposure.***

Module 2

- ***Explosive Range*** - *LEL(LFL) ----- UEL(UFL)*
  - ***Is the Range of concentration of a substance that will explode or burn in air.***




FIRE
NO FIRE
NO FIRE
19.32%
19.5%
20.55%
20.75%
20.79%
20.8%
OXYGEN
PEL
(0.01%)
IDLH
(0.2%)
LEL
(1.2%)
UEL
(7.1%)
TOLUENE

Flash Point Temperature

- Lowest temperature at which vapors are given off by that substance and forms an ignitable mixture in air. No sustained fire only a flash.

Example:
Gasoline has a Flash Point of -35° F
Diesel Fuel has Flash Point of 104°F

TERMS

- **Specific Gravity**
  - The unit of measurement used to describe the physical characteristic of materials - specifically the weight of a material in comparison to water - where water equals 1.0.

Example: Gasoline has a specific gravity of 0.7

TERMS

- ***Vapor Density***
  - ***Same as above but relates to air where Air equal 1.0.***

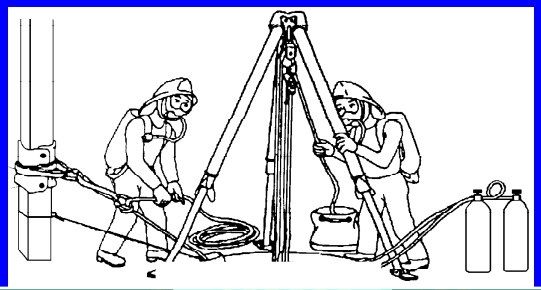
Example:
Gasoline has A Vapor Density of 1.7

Module 2

Common Gases and Vapors of Concern.

- OXYGEN
- NITROGEN
- HYDROGEN SULFIDE
- METHANE
- CARBON MONOXIDE
- CARBON DIOXIDE
- NITROGEN DIOXIDE

TESTING OF THE ATMOSPHERE AT THREE(3) LEVELS



Methane

LIGHTER THAN AIR

CARBON MONOXIDE

SAME AS AIR

Hydrogen Sulfide

HEAVIER THAN AIR

NJSP/HMRU Confined Space Awareness
Monitoring Device - Selection

- Ease of operation
- Reliable
- Fast response time
- Easy to read on output
- Portability
- Sensitive and Selective
- Intrinsically Safe
- Firefighter Proof

Module 2 Atmospheric Testing

Atmospheric testing is required for two distinct purposes:

- ***Evaluation of the hazards within the space.***
- ***Verification that acceptable conditions exist for entry.***

Module 2 Atmospheric Testing

- Detect the presence of a hazard
- Determine if material is dispersing or concentrating
- Ensure workers have adequate protection
- Determine if hazard is affecting surrounding areas
- Ensure proper selection of work practices.
- Periodic testing vs Continuous

MONITORING

DETERMINE NEED FOR MONITORING

WHAT ATMOSPHERIC PROBLEMS MAY EXIST?

SELECT MONITORING EQUIPMENT

CALIBRATE MONITORING EQUIPMENT

OXYGEN DEFICIENCY OR ENRICHMENT	**FLAMMABLE**	**TOXIC**
MONITOR OXYGEN	MONITOR FLAMMABLES	IDENTIFY SPECIFIC TOXIC CONTAMINANTS DETERMINE ACCEPTABLE LEVEL
OXYGEN BELOW 19.5% OXYGEN ABOVE 23.5%	DETECT ABOVE 10% LEL	MONITOR TOXICS LEVEL EXCEEDS ACCEPTABLE LIMITS

TAKE ACTIONS TO CORRECT PROBLEM

PROTECT PERSONNEL

CONTACT PERSONNEL WHO CAN TAKE CORRECTIVE ACTIONS

TREE

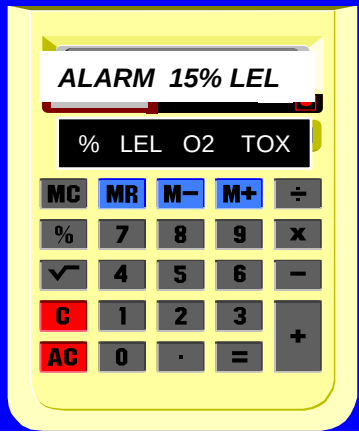
Atmospheric Testing Priority

- *Test for Oxygen* ***19.5% to 23.5*** *% by volume.*
- *Test for flammability Not exceed 10% of the LEL .*
  - *(Combustible Gas Indicators are rated for normal atmospheres of oxygen).*
- *Test for Toxicity Depends upon toxic products (MSDS).*

FACTORS INFLUENCING THE READING

INSTRUMENT FACTORS

- Proper equipment operation
- Instrument calibration & calibration checks
- Equipment detection range
- Device relative response *(compared to calibration gas)*
- Response time
- Inherent safety



NON-INSTRUMENT FACTORS

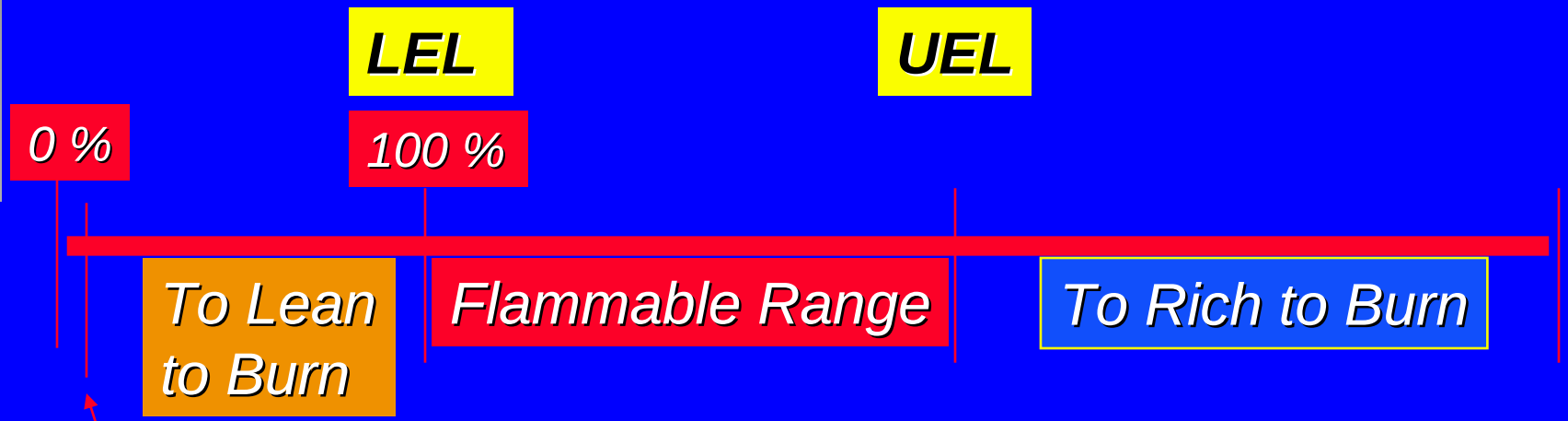
Nature of the hazard

Environmental conditions

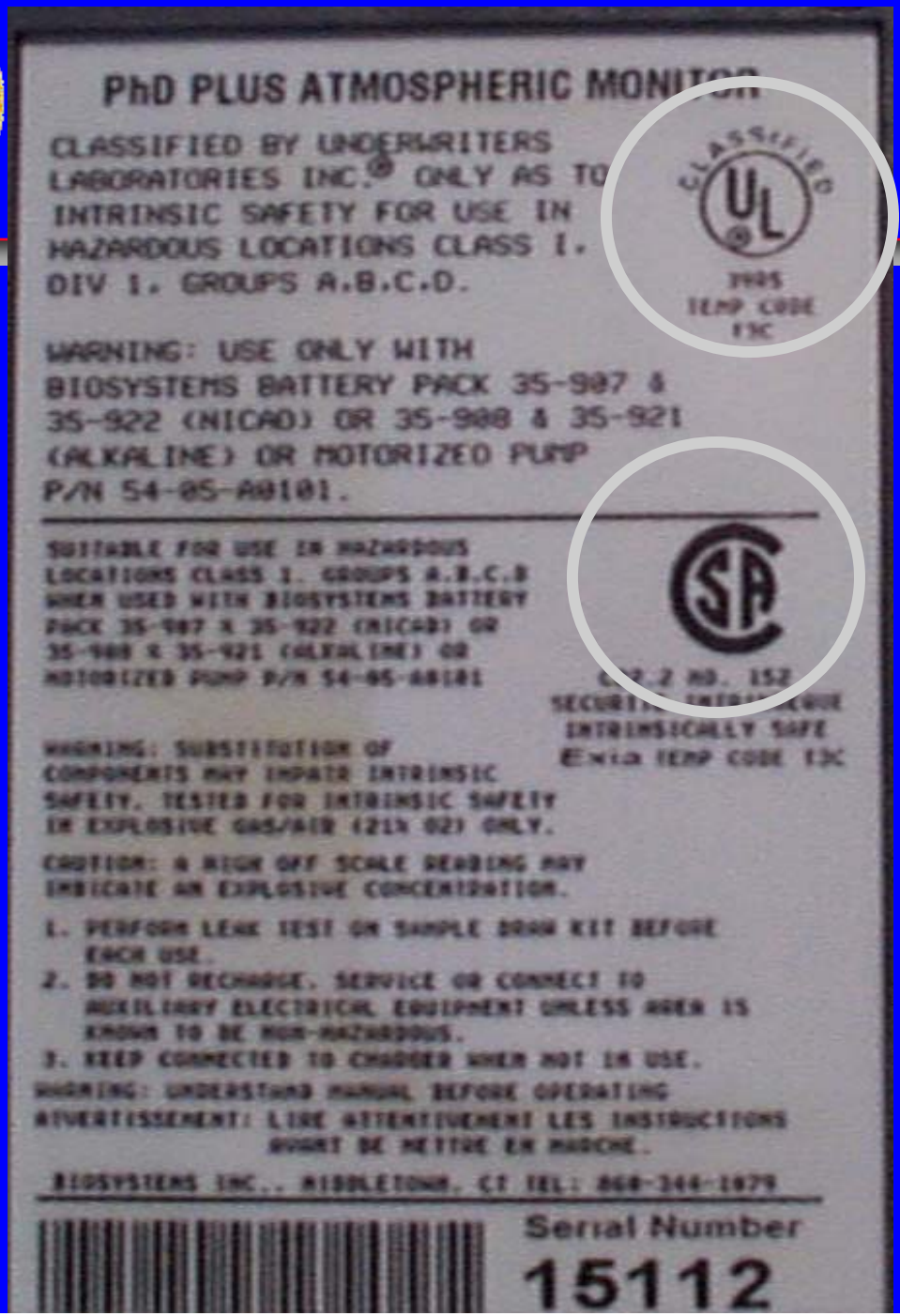
Location of monitoring

Atmospheric Testing

Flammable Range



10 % of the LEL for Confined Space


PhD PLUS ATMOSPHERIC MONITOR
CLASSIFIED BY UNDERWRITERS LABORATORIES INC.® ONLY AS TO INTRINSIC SAFETY FOR USE IN HAZARDOUS LOCATIONS CLASS I. DIV 1. GROUPS A,B,C,D.
CLASSIFIED UL
WARNING: USE ONLY WITH BIOSYSTEMS BATTERY PACK 35-907 & 35-922 (NICAD) OR 35-908 & 35-921 (ALKALINE) OR MOTORIZED PUMP P/N 54-85-A0101.
SUITABLE FOR USE IN HAZARDOUS LOCATIONS CLASS I. GROUPS A,B,C,D WHEN USED WITH BIOSYSTEMS BATTERY PACK 35-907 & 35-922 (NICAD) OR 35-908 & 35-921 (ALKALINE) OR MOTORIZED PUMP P/N 54-85-A0101
INTRINSICALLY SAFE
WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY. TESTED FOR INTRINSIC SAFETY IN EXPLOSIVE GAS/AIR (21% O2) ONLY.
CAUTION: A HIGH OFF SCALE READING MAY INDICATE AN EXPLOSIVE CONCENTRATION.
1. PERFORM LEAK TEST ON SAMPLE DRAW KIT BEFORE EACH USE.
2. DO NOT RECHARGE, SERVICE OR CONNECT TO AUXILIARY ELECTRICAL EQUIPMENT UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.
3. KEEP CONNECTED TO CHARGER WHEN NOT IN USE.
WARNING: UNDERSTAND MANUAL BEFORE OPERATING
AVERTISSEMENT: LIRE ATTENTIVEMENT LES INSTRUCTIONS AVANT DE METTRE EN MARCHE.
BIOSYSTEMS INC., MIDDLETOWN, CT TEL: 860-344-1879
Serial Number
15112

EXPLOSION-PROOF Versus INTRINSICALLY SAFE

MSA

Combustible Gas and O_2 Alarm

FACTORY MUTUAL

FM

APPROVED

Model 260 part no. 449900

calibrated for **Pentane**

Intrinsically Safe for use in hazardous locations Class 1, Division 1, Groups C and D and Non-incentive for use in Class 1, Division 2, Groups A, B, C, and D when used with MSA Battery, Part No. 457839

MUST BE OPERATED IN ACCORDANCE WITH INSTRUCTIONS

MFD. BY

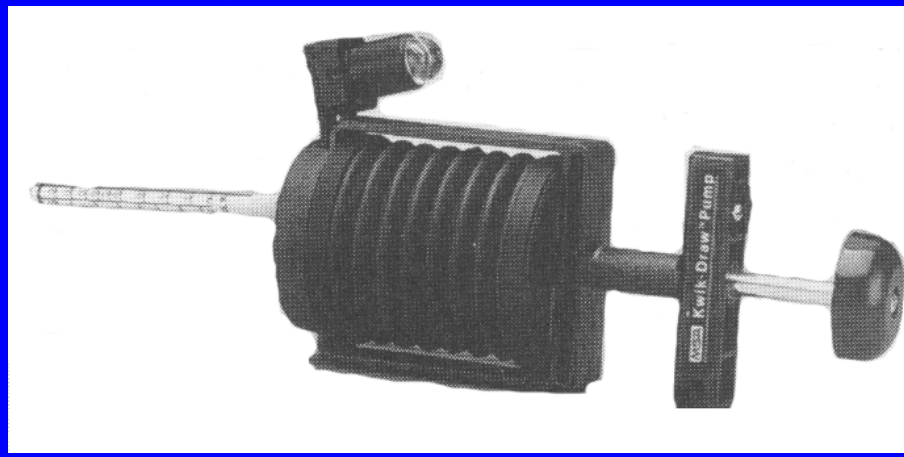
MINE SAFETY APPLIANCES COMPANY

1/22/2008

EXAMPLE OF CERTIFICATION

Module 2-Type of Detector's

- *Flame Ionization Detector (FID)*
- *Colorimetric Tubes*
- *Photoionization Detector (PID)*
- *Combustible Gas Indicator (CGI) (explosivmeter)*
- *Oxygen Meters (O2)*



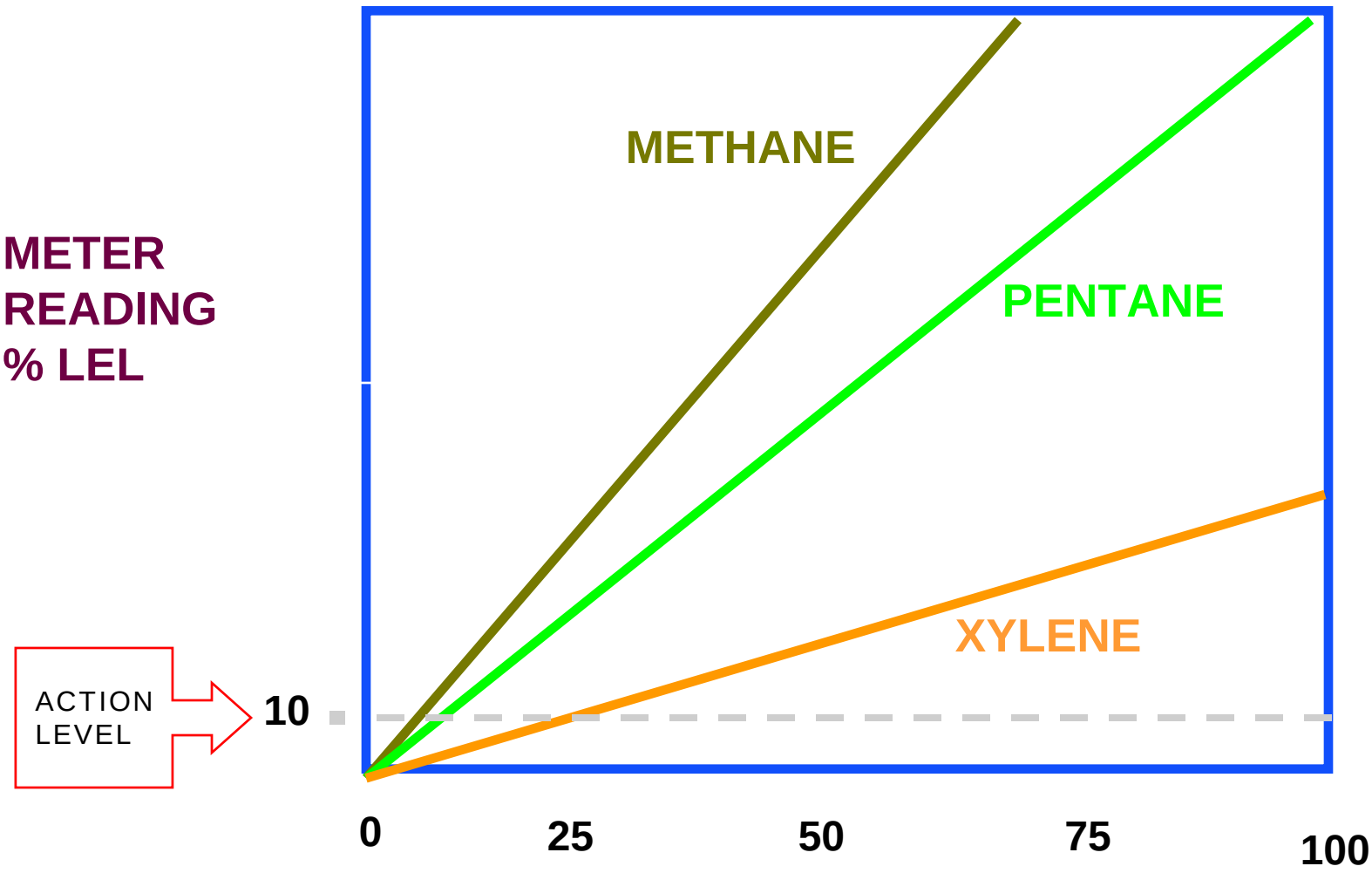
THE COMBUSTIBLE GAS INDICATOR


PROPERTY OF
PINEWALD FIRE CO.
STATION 20
MSA
PASSPORT
Pump
Sampling Tube

Four Gas Combustible Gas Monitor

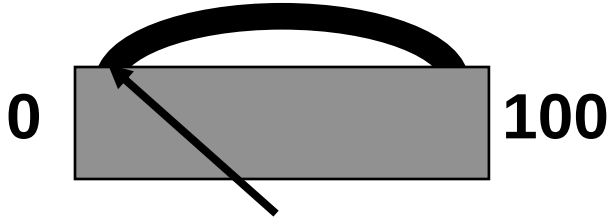

PINEWALD
PhD

Relative Response

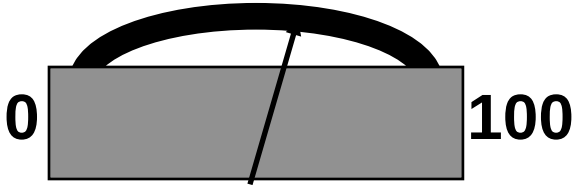


CALIBRATION GAS IS PENTANE

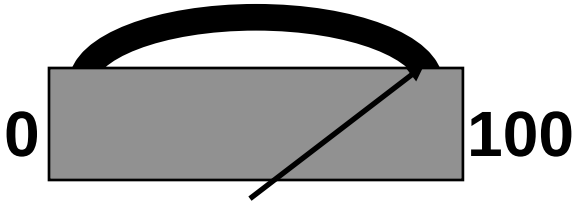
CGI RESPONSE TO METHANE (LEL 5.3%, UEL 14%)



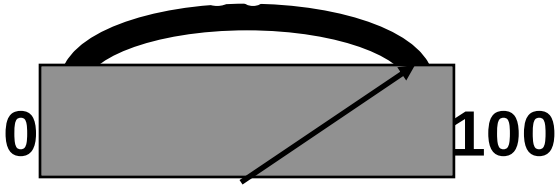
NO METHANE 0%



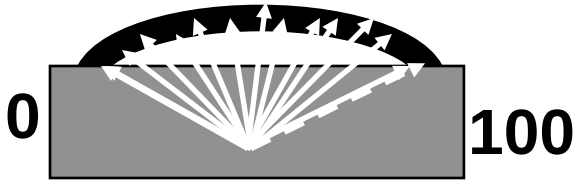
BELOW LEL 0 - 5.3%



AT LEL 5.3%



IN EXPLOSIVE RANGE
5.3 - 14%



ABOVE UEL
OVER 14%

MEASUREMENT OF CONCENTRATION

CONVERTING PERCENT (1/100) TO PPM (1/1,000,000) ONE PART PER MILLION IS EQUAL TO 1/1,000,000

EXAMPLE:
LEAKING PROPANE TANK
FLAMMABLE RANGE FOR PROPANE (2.1% TO 9.5%)

LET'S SAY A READING ON THE CGI YIELDED 25% LEL
THIS WOULD INDICATE THE PRESENCE OF ONE-FOURTH THE CONCENTRATION OF PROPANE NEEDED TO READILY IGNITE.

THE CGI IS THEREFORE READING THAT 0.53% OF PROPANE EXISTS IN THE AIR. (2.1 * 0.25 = .53)

BY CONVERTING PERCENT (1/100) TO PPM (1/1,000,000), THE CONCENTRATION CAN BE EXPRESSED AS 5,3000 PPM

CGI SUMMARY

TYPE OF ATMOSPHERE:	FLAMMABLE
METHOD OF DETECTION:	CATALYTIC FILAMENT
CALIBRATION STANDARD:	METHANE, PENTANE,HEXANE
CHECK STANDARD:	METHANE, PENTANE, HEXANE
RANGE OF DETECTION:	PERCENTAGE CONCENTRATIONS
RESPONSE TIME:	DEPENDS ON LENGTH OF SAMPLE LINE
POWER SOURCE:	BATTERY-POWERED
OPERATING TEMPERATURES:	DEPENDS
KEY LIMITATIONS:	AFFECTED BY LEAD, O_2 DEPENDENT

OXYGEN METER SUMMARY

TYPE OF ATMOSPHERE: NORMAL

METHOD OF DETECTION: CHEMICAL REACTION

CALIBRATION STANDARD: OXYGEN

CHECK STANDARD: ATMOSPHERIC OXYGEN (21%)

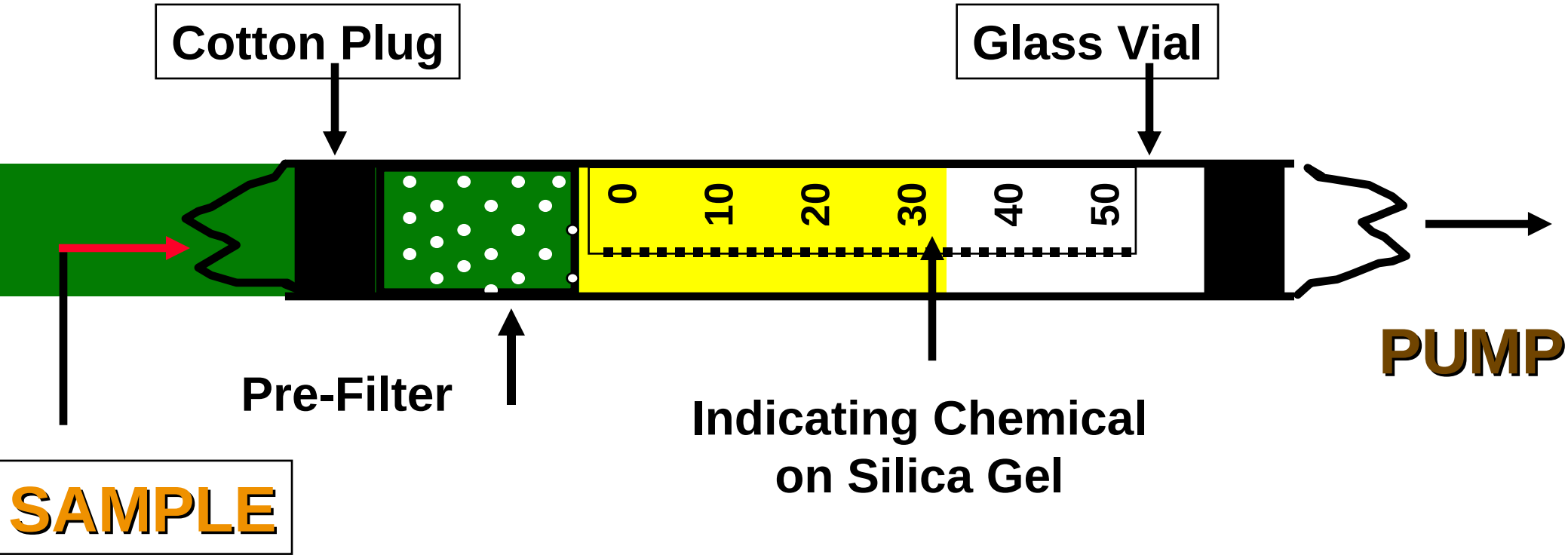
RANGE OF DETECTION: 0 - 25%

RESPONSE TIME: DEPENDS ON DIFFERENCE FROM 21%

POWER SOURCE: VARIES

OPERATING TEMPERATURES: ABOVE FREEZING

KEY LIMITATIONS: CO_2 INTERFERES WITH METER

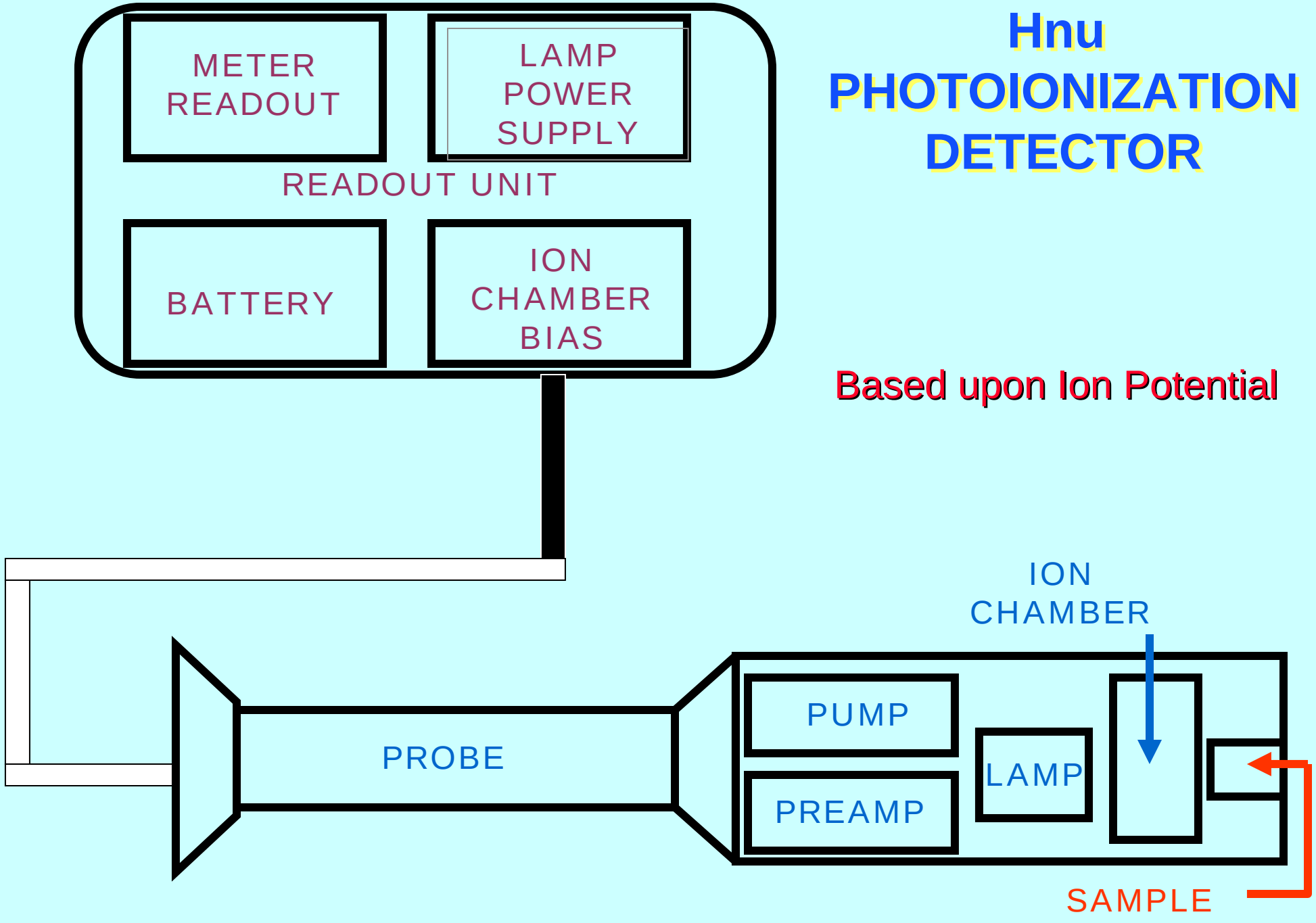


DETECTOR (COLORIMETRIC) TUBES

DETECTOR TUBE SUMMARY

TYPE OF ATMOSPHERE:	INORGANIC/ORGANIC VAPORS/GAS
METHOD OF DETECTION:	CHEMICAL REACTIONS
RANGE OF DETECTION:	PPM TO PERCENT
RESPONSE TIME:	50 SECONDS TO 30 MINUTES
POWER SOURCE:	NOT REQUIRED
OPERATING TEMPERATURES:	DEPENDS ON TUBE
KEY LIMITATIONS:	INTERFERENCES

Hnu
PHOTOIONIZATION DETECTOR



Based upon Ion Potential

PHOTOIONIZER SUMMARY

TYPE OF ATMOSPHERE: ORGANIC VAPORS

METHOD OF DETECTION: PHOTOIONIZATION

CALIBRATION STANDARD: BENZENE, ISOBUTYLENE

CHECK STANDARD: ISOBUTYLENE

RANGE OF DETECTION: < 2,000 ppm

RESPONSE TIME: 5 TO 30 SECONDS

POWER SOURCE: LEAD ACID GEL OR LITHIUM BATTERY

OPERATING TEMPERATURES: ABOVE FREEZING

KEY LIMITATIONS: HIGH HUMIDITY, ONLY GASES WITH Ips BELOW THE LAMP eV CAPACITY WILL BE DETECTED

FLAME IONIZATION DETECTOR

TYPE OF ATMOSPHERE: ORGANIC VAPORS

METHOD OF DETECTION: FLAME IONIZATION

CALIBRATION STANDARD: METHANE

CHECK STANDARD: METHANE

RANGE OF DETECTION: UP TO 10,000 PPM METHANE

RESPONSE TIME: 5 TO 15 SECONDS

POWER SOURCE: LEAD ACID GEL BATTERY

OPERATING TEMPERATURES:: ABOVE FREEZING

KEY LIMITATIONS: SUPPLY OF PURE FUEL IS NEEDED, NEEDS OXYGEN TO OPERATE

End of Module #2

Module 3

OBJECTIVES

- Identify the training required for attendants, entrants and supervisor's for confined space work.
- Describe the requirements of a confined space program.
- Describe the purpose of a confined space permit.
- Describe the duties of attendants and supervisors for confined space work.

Module 3

Elements of a Confined Space Program

- Must be qualified
- Written procedures
- Spaces marked & ID
- Specific training required for employees by employer.
- Training in the use and selection of PPE
- Assure on-site availability of safety equipment or services
- Required use of retrieval lines

Module 3

Elements of a Confined Space Program

- Provide & maintain proper monitoring devices.
- Monitor & evaluate hazards - training required by entrants.
- Provide an attendant for each entry.
- Provide and maintain all equipment to make safe entry.
- Train employees to perform atmospheric monitoring and calibration.
- Establish a permit entry system.

Module 3

Entry *consists of an Organized Plan for the normal or routine entry into a space or area for:*

- ***Maintenance***
- ***Inspection/Testing***
- ***Repair/Replacement/Installation***

Module 3

Entry Permit System

- Written SOP's (SOG's) on issuing permits.
- Written SOP's that ID all confined spaces that employees may enter.
- Written lists of actual and potential hazards of each space
- Written SOP's that list specific monitoring required for each space.
- Written SOP's that describe calibration & testing of equipment.
- Written SOP's how openings will be guarded and or posted.
- Preplanned emergency evacuation or rescue procedures.

Module 3

Entry Permit System (continued)

- Listing by job title and individual name of who will perform what work.
- Mandatory training for all those involved in any aspect of the entry.
- The system must provide, by appropriate testing, that the control measures are effective.

NJSP/HMRU Confined Space Awareness

Module 3

- *Entry Permit - Required for all confined space entries including **EMERGENCY RESPONSE TRAINING EXERCISES***
- *Copy Posted at Entry Site or space.*
  - ***Describe the hazard known or reasonable expected***
  - ***Specify the minimum acceptable conditions for entry/work.***
  - ***Make provisions to certify that the pre-entry requirements are met.***
  - ***Specify by name or job title the person authorizing or in charge of entry.***
  - ***Name of the Attendant.***
  - ***Assure that a rescue team is available.***
  - ***Be signed by the operation's supervisor and all attendants & entrants.***

Module 3

Entry Permit - Continued

- Specify procedures and certify that isolation, cleaning, purging, inerting, or ventilation have been performed prior to entry to control hazards.
- Describe any other hazard that might reasonably be expected to be generated by the activities performed by the entrants and specify any work procedures to be followed.
- Specify PPE (Including Respiratory) N.J.A.C .12:100-4.2(a)7.
- Specify atmospheric testing to be done and Designate the person who will perform it.

NJSP/HMRU Confined Space Awareness

POSTING of PERMIT

HOT WORK PERMIT

- *"Hot Work" is any operation that is capable of providing an ignition source for flammable materials through a heat source, static discharge or other ignition source. Examples of hot work are :*
  - *Riveting - Sand Blasting*
  - *Welding - Cutting/Burning*
- *Check State, Local regulations as well as any organizational policy prior to issuance of permit.*

RESCUE PROCEDURES

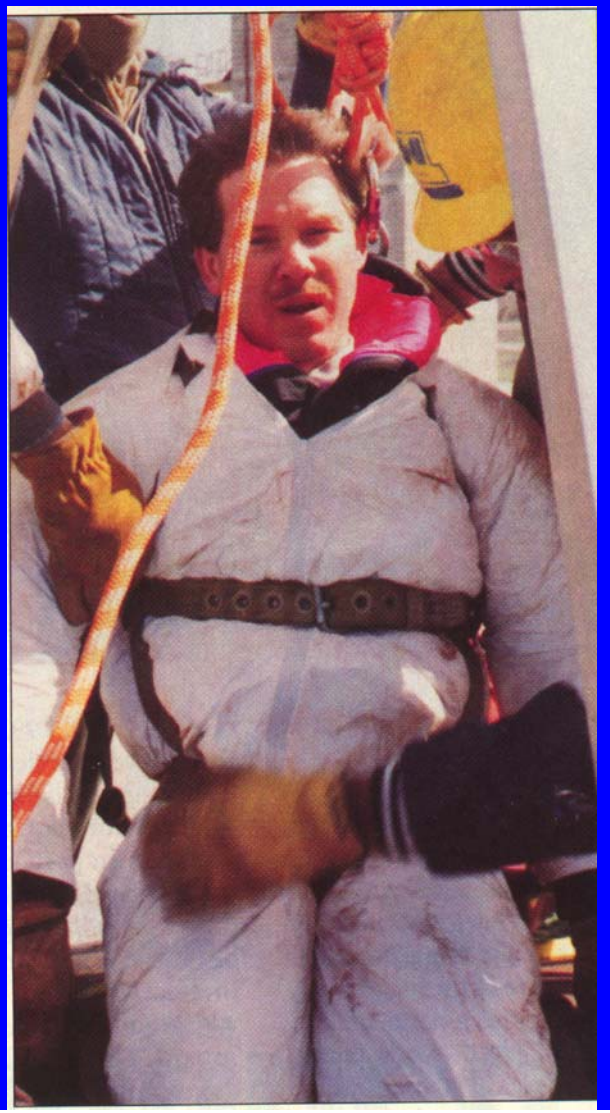
- *Specify rescue equipment required for the space.*
- *Rescue equipment shall be available at point of entry.*
- *At least one member of each rescue team will have current certification in basic 1st. aid and CPR.*

NJSP/HMRU Confined Space Awareness

Module 3

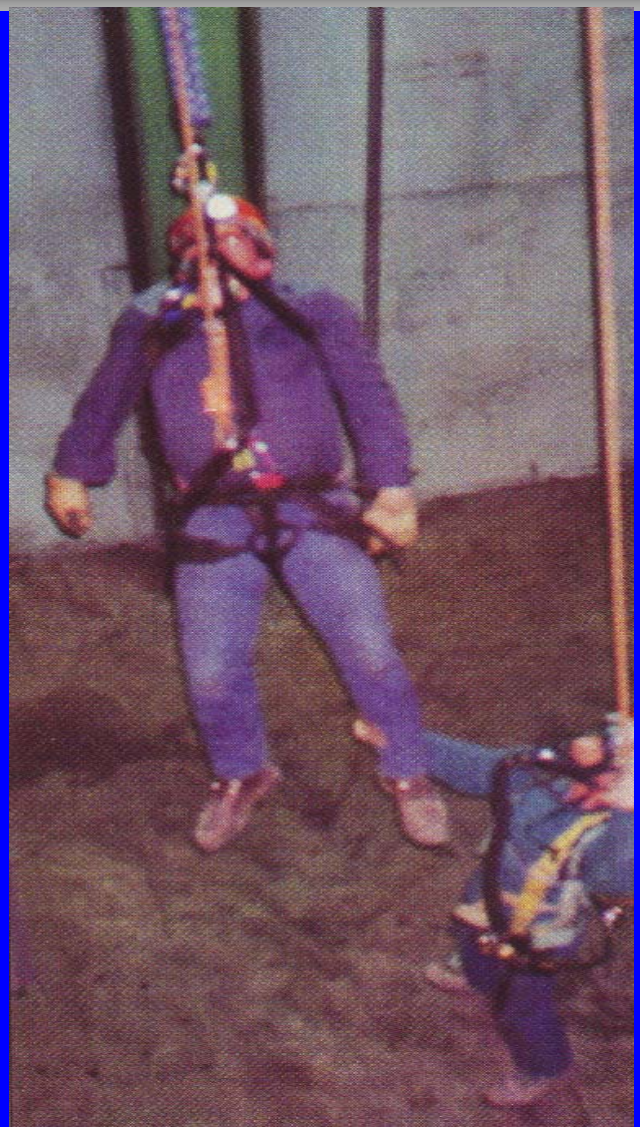
Rescue consists of removal from space or area with or without assistance to prevent injury death or due to changing space conditions:

- *Self Rescue (Most preferred)*
- *Assisted by work crew*
- *On-site team*
- *Off-Site Team*



Recovery

- The physical removal of damaged components within the space or individuals who have died and are still within the space or area.



ATTENDANTS

- Remain outside the confined space at all times for the duration of the entry.
- Maintains continuous communication with each of the entrants inside .
- Have authority to order entrants to exit at the first indication of not-permitted or unsafe condition.
- Be able to summon emergency assistance without leaving proximity of the space.
- Warn unauthorized persons not to enter the confined space.

SUPERVISORS OF ENTRIES

- The person in charge of the entry will be trained to recognize the symptoms and effects of exposure to the substances expected to be present in the confined space and carry out the following duties:
  - Assure the pre-entry portions of the permit are completed before any employees enters the confined space.
  - Verify necessary pre-entry conditions.
  - Verify if an in-plant rescue team is to be used, that they are available.
  - Verify the means of summoning emergency assistance are operable.
  - Terminate the entry upon becoming aware of a not-permitted condition.

ENTRANTS

- *An entrant is any worker authorized and qualified to safely enter and work in a confined space.*
- *All authorized confined space workers and rescuers will receive training (including annual re-training) in the following areas:*
  - ***The nature of the hazards in the confined spaces and the appropriate testing to determine if the space is safe to enter.***
  - ***Use PPE and special equipment that is required for entry or rescue operations.***
  - ***Self-rescue (exit) procedure and techniques***
  - ***Recognition warning sign from exposure to hazardous substances.***
  - ***Toxic effects and symptoms of exposure that they can expect in the spaces***
  - ***Modifications of normal work practices***
  - ***Use and calibration of atmospheric equipment***

RESCUER

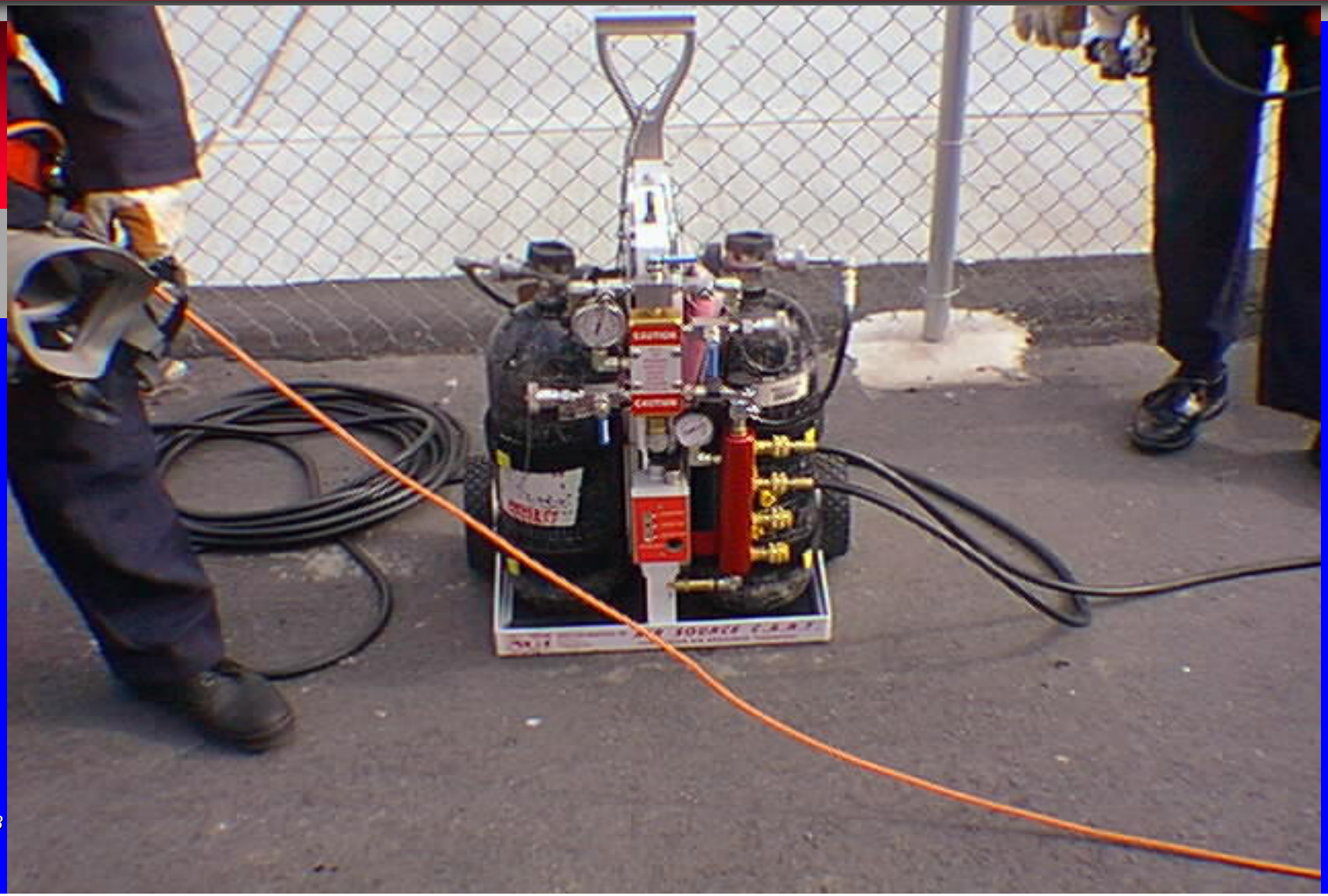
- Concerned for the safety of your rescue personnel
- Concerned for the safety of site personnel who may enter the space in a misguided attempt to effect a fast rescue.
- Concerned for the safety of victims who are in the confined space.

RESCUE TEAMS

- Must train at least once a year in the type of spaces where they are expected to effect rescues.
- Have written entry plans and rescue plans for each space.
- Have at least one individual trained in 1st Aid and CPR.
- Have the equipment available to conduct a safe entry or rescue.
- Have specific equipment depending on the hazard presented.

THREE-WAY TALK BOX COMMUNICATION

AIR CART



TRI-POD AND RIGGING

SUPPLIED AIR RESPIRATOR

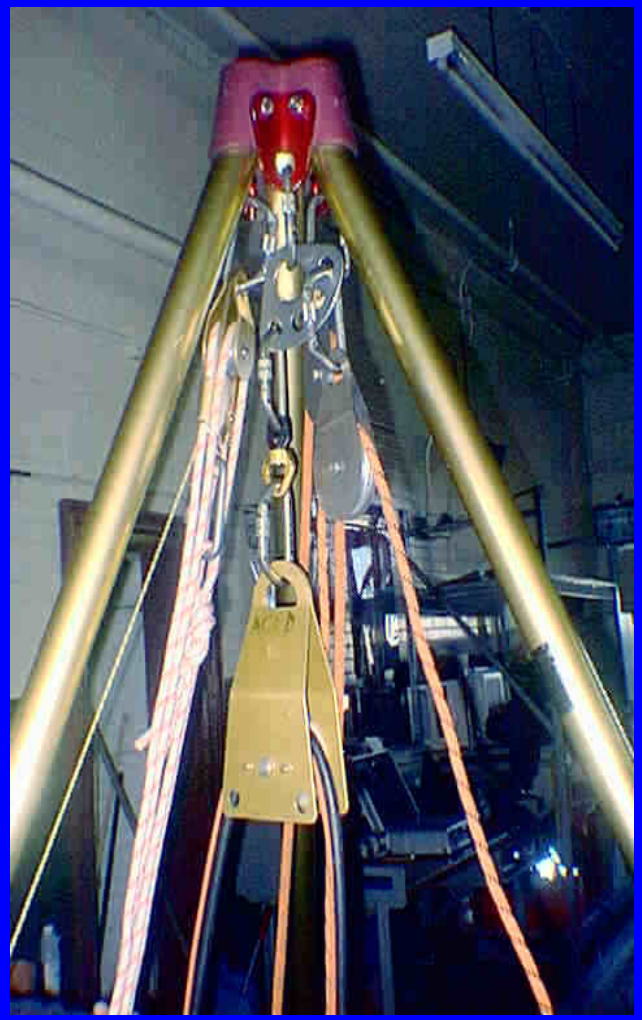

ATLA
FIRE
TRAIN

VARIOUS EQUIPMENT

Z-RIG IN ACTION

THE RESCUE

RIGGING



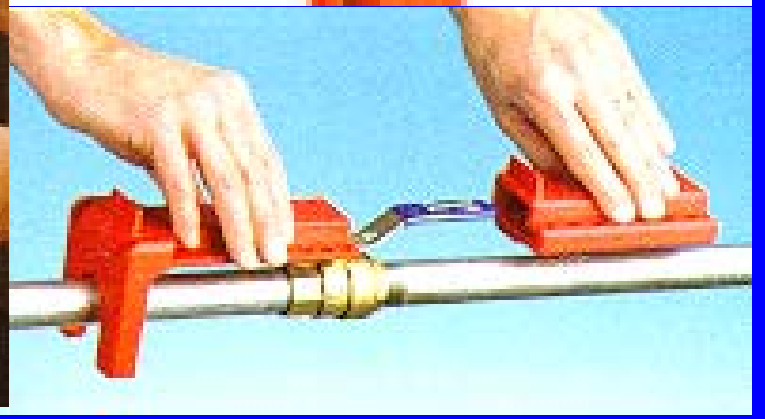
- TRIPOD
- CARABINERS
- PULLEYS
- RIGGING PLATE
- SWIVEL
- LOAD & SAFETY LINES
- AIR LINES
- COMMUNICATION

Working with a tripod, air lines, retrieval lines takes practice and experience.

PPE

Module 4

LOCK-OUT - TAG-OUT



NJSP/HMRU Confined Space Awareness

Module 4

Objectives :

- Describe the purpose of a lock-out tag-out program.
- Describe the reason why each worker in the lock-out tag-out program shall have their own lock.
- Describe why lock-out devices are used with tag-out devices.

Module 4 Lock-out/Tag-out

The purpose of the regulations are to:

- prevent accidents due to machinery/equipment start-up and,
- or unexpected releases of stored energy or materials,
- when maintenance or service is being performed. This would include emergency operations.

Module 4 Lock-out/Tag-out

They include: *(NJAC 12:100-11)*

- *(OSHA 29CFR 1910.147)*

- *all work environments that pose the possibility of mechanical hazards,*
- *electrical hazards,*
- *engulfment hazards for workers.*

Module 4 Lock-out/Tag-out

They Include:

- Written Program of SOP's
  - The steps (in proper sequence) for shut -down and securing all machines, equipment
  - Identify energy sources controlling the equipment.
  - Procedure for applying lock-out/tag-out devices to include their location of placement and names of authorized person(s) to apply devices.
  - Test method to be used to ensure that device is shut or safely isolated.
  - Steps (in proper sequence) for restarting.

Module 4 Lock-out/Tag-out

- *Written Program of SOP's (continued)*
  - ***Employees authorized to lock-out /tag-out should be identified***
  - ***Group Lock-out if more that one individual to perform work. (may be used for extended periods)***
  - ***Audits of the system shall be performed annually.***
  - ***Employee training documents***

Module 4 Tag-out

- *Process/procedure to physical tag each closed or shut system, or device with a tag to clearly identify that the system has been removed from service.*
- *Shall include date, time, system numbers, responsible party(s) duration. Shall include who to contact with Telephone Numbers.*

Module 4 Lock-out/Tag-out

- *Remember - Tags alone do not restrain.*
- *Padlocks are better than tags.*

Isolation

The process of physically removing or disconnecting lines, piping etc. to physically separate the area, device or part of the process line.

LOCKOUT TAGOUT

- APPLY TO ALL WORK ENVIROMENTS THAT POSE
  - MECHANICAL
  - ELECTRICAL
  - ENGULFMENT HAZARDS
- WRITTEN SOPS

LOCK-OUT, TAG-OUT

NJSP/HMRU Confined Space Awareness

Appendix A-Guidance Documents

- Safety Rules for Confined Space Work
- Routine Confined Space Entry Procedures
- Pre-entry Checklist
- Pre-entry Checklist Atmospheric Testing.

Appendix B- Case Histories

See Case History in Student Manual.

Appendix C - N.J.A.C. Regulations

- **N.J.A.C. 12:100-9 & 11**
  - *Current New Jersey Administrative Regulations that are specific to New Jersey workers protected under PEOSH (Public Employees).*

Alert Bulletin

- *Alert Bulletin # 3 now Ref. OSHA for Lock-out*
- *Alert Bulletin #4 now Ref. OSHA CS Entry*

F.A.I.L.U.R.E.

- ***F****ailure to understand or underestimate the environment.*
- ***A****dditional medical implications not considered.*
- ***I****nadequate rescue skills*
- ***L****ack of team work and or experience.*
- ***U****nderestimating the logical needs of the operation.*
- ***R****escue vs Recovery mode not considered.*
- ***E****quipment not mastered.*

Hazards Are Everywhere !!!!

New Jersey State Police
Hazardous Materials Response Unit

END PROGRAM

Credits:

Hazardous Materials Response Unit

(HMRU)

- ***There are several certification and recertification requirements for firefighters in New Jersey from various agencies. Synopses of them are listed below:***
- ***Required for all responders:***
- ***Bloodborne Pathogens Training:*** *Training required by and must meet N.J.A.C. 12:100-4.2. Initial training and annual refresher training no set hours for either. Initial and Refresher Training must cover all topics in 29 CFR 1910.1030 and to keep proficiency. NJ Department of Health and Senior Services. (609) 984-1863* http://www.state.nj.us/health/eoh/peoshweb/peoshact.htm
- ***Right to Know Training:*** *Initial training and refresher training every two years. Training required by and must meet N.J.A.C. 8:59-6. Initial training four hours and refresher training two hours. NJ Department of Health and Senior Services. (609) 984-2202* http://www.state.nj.us/health/eoh/rtkweb/
- ***Hazardous Materials Training:*** *Awareness and Operations. Initial and refresher training. Includes SCBA. Training required by and must meet 29 CFR 1920.120. Initial Awareness training eight hours. Refresher training has no set hours, but must cover topic in sufficient depth to keep proficiency. Initial Operations training 12 hours. Annual refresher training has no set hours, but must cover topic in sufficient depth to keep proficiency. US Department of Labor.* http://www.osha.gov/index.html
- ***Confined Space Training:*** *Departments with the potential for confined space work must have initial training required by and must meet NJAC 12:100-9. Initial training and refresher training no set hours. Must cover topics in 29 CFR 1910.146. Refresher training when procedures or confined spaces change. US Department of Labor.* http://www.osha.gov/index.html
- ***Incident Management System Training:*** *Firefighter I Certification required. All fire service personnel are required to complete the two-hour introductory ICS Orientation (I-100) by February 17, 1999. Supervisory personnel are required to complete additional ICS Basic (I- 200) by February 17, 2000. Training required by and must meet NJAC 5:73-6.1. IMS Orientation (I-100) initial training two hours. IMS Basic (I-200) initial training 12- 16 hours. No refresher training required. NJ Division of Fire Safety. (609) 633-6321* http://www.state.nj.us/dca/dfs/bfds.htm
- ***Instructor Certification:***
- ***Instructor Requirements:*** *Firefighter I certification required. Instructors who actually teach live fire training for any fire department or fire academy must be certified to at least Fire Instructor Level I and Live Burn Instructor and Smokehouse/SCBA Instructor. The instructor in charge of the evolution must be certified as a Fire Instructor II. Required by NJAC 5:73-1.6. Initial training General Safety Course, 16 hours; Instructional Techniques for Company Officers, 12 hours; Live Burn, eight hours; SCBA Smokehouse, eight hours. Recertification requirements set a three-year cycle for recertification. Instructor Level I or Level II requires 15 hours of training within the cycle. Live Burn and Smokehouse/SCBA requires 0.25 hours of training within the cycle. (609) 633-6321* http://www.state.nj.us/dca/dfs/bfds.htm
- ***Optional Certifications:***
- ***Fire Inspector Certification:*** *Initial training 90 hour Fire Inspector Course. In order to certify you must pass the BOCA fire inspector test. Recertification 20 hours (2.0 CEUs) every three years. NJAC 5:71-4. NJ Division of Fire Safety. (609) 633-6321* http://www.state.nj.us/dca/dfs/bfds.htm
- ***Fire Official Certification:*** *Fire Inspector Class required for certification. Initial training 30-hour initial training. 10 hours (1.0 CEUs) plus Fire Inspector 2.0 CEUs every three years to recertify. NJAC 5:71-4. NJ Division of Fire Safety. (609) 633-6321* http://www.state.nj.us/dca/dfs/bfds.htm
- ***Emergency Medical Technician - Basic:*** *Initial training 110 hours. Recertification 48 hours in a three year period. 24 hours core and 24 hours elective. NJ Dept of Health and Senior Services, Office of Emergency Medical Services. Defibrillation: Initial Training about 6 hours. Annual recertification about two hours. Refresher no less than every 90 days about 1 to 2 hours. NJ Department of Health and Senior Services, Office of Emergency Medical Services. (609) 633-7777* http://www.state.nj.us/health/ems/emseducation.htm
- ***Cardiopulmonary Resuscitation:*** *Initial training four hours. Refresher training two hours every two years. American Heart Association or American Red Cross.*
- http://www.americanheart.org/ http://www.redcross.org/

Confined Space Awareness Quiz

1. **The legal standards that require confined space training are administered by:**

A) ANSI

B) NIOSH

C) OSHA & PEOSHA

D) National Safety Council

2. **A confined space is defined by PEOSHA as an area that has;**

A) Limited openings for access, unfavorable natural ventilation, possible hazardous atmosphere, not for continuous employee occupancy

B) Limited openings for access, favorable ventilation, possible hazardous atmosphere, not for continuous employee occupancy.

C) Limited openings for access, less the 10 air exchanges per hour, 100 cu. ft. volume, not for continuous employee occupancy.

D) Less than four openings for access, unfavorable ventilation, not for continuous employee occupancy.

Confined Space Awareness Quiz

3. A confined space program must:

A) Be verbally explained by a supervisor upon request.

B) Provide employees with all training necessary to perform their duties.

C) Insure that rescue equipment is nearby for the use of a rescue squad.

D) A&B

E) B&C

4. The purpose of a confined space permit is to:

A) Determine if employees are eligible for hazard duty pay.

B) Document the fact that employees making an entry have proper training.

C) Ensure that only employees with proper training will wear SCBA's during entry.

D) Ensure that employees are aware of the hazards they may encounter in the area they are about to enter.

Confined Space Awareness Quiz

5. Four physical hazards associated with confined spaces are:

A) Leaks, sloping walls, heat, toxics.

B) Asphyxiation, explosion, unstable walls, flammable atmospheres.

C) Hazardous atmospheres, unstable footing, biologics, vapors.

D) Limited access, poor ventilation, poor lighting, engulfment.

6. Chemical hazards likely to be encountered in a confined space are: (check all that apply)

A) Etiologic agents.

B) Toxic vapors.

C) Engulfment.

D) Loose tools.

Confined Space Awareness Quiz

7. The LEL of a hazardous material is:

A) The Lowest exposure limit - the lowest concentration of a material in air that will affect workers.

B) The Lower Explosive Limit - the lowest concentration of the material in air that will explode.

C) The Lowest Exposure Level - the lowest concentration of the material in air that has caused a fatality in the field.

D) The lower Estimated Limit - the lowest concentration of the material in air that toxicologists believe will affect 50% of the workers.

Confined Space Awareness Quiz

8. The purpose of a lockout/tagout program is:

A) To prevent worker injury through energy or material release.

B) To de-energize electrical equipment while it is being worked on.

C) To prevent engulfment injuries.

D) A, B, & C.

Confined Space Awareness Quiz

9. Of the people killed in confined spaces, over 60% are:

A) Persons attempting a rescue.
B) Department of Public Works employees.
C) Heavy industry workers.
D) Construction workers

10. Most fatalities in confined spaces are the result of;

A) Electrical hazards
B) Falling from heights.
C) Explosions and fires.
D) Hazardous atmospheres.

Confined Space Awareness Quiz

11. Which group's standards directly regulate fire or police departments who make confined rescues/entries (in N.J.)

A) ANSI

B) OSHA

C) PEOSHA

D) NIOSH

E) National Safety Council

Confined Space Awareness Quiz

12. When monitoring the air of a confined space, you should check the oxygen level first because:

A) Oxygen content alone can tell you if there is a breathable atmosphere.
B) You have to start somewhere.
C) Many test instruments will not function properly in an oxygen deficient atmosphere.
D) It will tell you if you have to deal with a fire hazard.
E) A& D.

13. A confined space with an atmosphere of 20.5% oxygen;

A) Could also be contaminated with some unknown material.
B) Is Oxygen enriched
C) Is oxygen deficient
D) Is perfectly safe.

Confined Space Awareness Quiz

14. Atmospheric monitoring is not required for a confined space that has undergone positive pressure ventilation for fifteen minutes.

A) True B) False

15. Noise can be significant hazard in confined spaces.

A) True B) False