Confined Space

Awareness and Safety

Session 1

Suffolk County Fire Academy

1

House-Keeping

- Instructors
- Students
- Paperwork
- Student Manuals
- Exits
- Cell Phones and Pagers.

2

Course Overview

2 Sessions

- Session 1
  - Statistics, Standards, Definitions
  - Response Plan & Incident Command System
  - Psychological Effects of Confined Spaces
  - Confined Space Hazards
  - Confined Space Examples
  - First To Arrive.

3

Course Objectives

- Define a confined space according to industry standards (NFPA 1006 7.1.5, NFPA 2500 7.2.4)
- Recognize the need for confined space technical rescue resources (NFPA 1006 7.1.6, NFPA 2500 7.2.4)
- Define the emergency response system for confined space emergencies (NFPA 2500 7.2.4)
- Determine methods for contacting and establishing communications with victims where possible (NFPA 1006 7.1.3, NFPA 2500 7.2.4).

4

Course Objectives Cont'd

- Recognize and identify the hazards associated with nonentry confined space emergencies (NFPA 2500 7.2.4)
- Identify the procedures of a nonentry search and retrieval (NFPA 1006 7.1.2, 7.1.4, NFPA 2500 7.2.4)
- Discuss the implementation of site control and scene management (NFPA 1006 7.1.1, NFPA 2500 7.2.4)
- Identify support procedures for operations and technician level responders within an IMS (NFPA 1006 7.1.7, NFPA 2500 7.2.4).

5

Session Objectives

- Student shall demonstrate an understanding of:
  - Confined space standards and definitions
  - Confined space response plans and the use of the incident command system
  - The psychological effects of confined spaces, specifically on victims
  - Examples of confined spaces and identification of their hazards
  - Actions to be taken as the first to arrive unit at a confined space incident.

6

STATISTICS, STANDARDS, DEFINITIONS

7

OSHA Statistics

- Almost 240,000 Establishments With 4.8 Million Permit Required Confined Spaces
- 1.6 Million Workers Enter These Spaces
- Average of 120 Fatalities Per Year
  - 1,030 Killed In between 2011 and 2018
  - Up to 60% are would-be rescuers
- 5,900 Lost Workday Accidents Per Year
- 7,000 Non-Lost Workday Accidents Per Year.

8

Standards

- OSHA 1910.146 – Permit Required Confined Spaces For General Industry
- OSHA 1910.147 – Control of Hazardous Energy
- ANSI/ASSE Z117.1 – Safety Requirements for Entering Confined Spaces
- NFPA 350 – Guide For Safe Confined Space Entry and Work
- NFPA 1006 – Standard For Technical Rescue Personnel Professional Qualifications
- NFPA 2500 – Standard For Operations and Training for Technical Search and Rescue Incidents (**New Consolidation**)

9

Standards

- NFPA Establishes 3 Levels of Personnel Training
  - Awareness
  - Operations
  - Technician
- Awareness Training is the **Minimum** Recommended Level For All Responders.

10

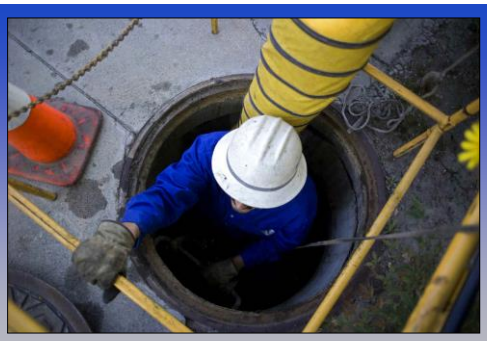
Confined Space Definition

1. Is Large Enough And Configured So Someone Can Enter And Work
2. Has Limited Or Restricted Entry Or Exit

AND

3. Is Not Designed For Continuous Occupancy.

11



12

Permit Required Confined Space

- **Has One or More of The Following Characteristics:**
  - **Hazardous atmosphere**
  - **Engulfment hazard**
  - **Space tapers to a smaller cross-section that could entrap or asphyxiate an entrant**
  - **Any other recognized serious safety or health hazard.**

13

Permit Required

Hazardous Atmosphere

Narrowing Container

Engulfment Hazard

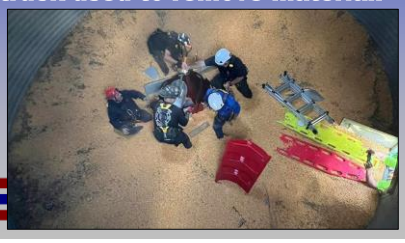
14

Engulfment Hazard

15

Engulfment Hazard

- **November 2023 - Tennessee**
  - **Victim 90% engulfed in corn kernels**
  - **Vac-truck used to remove material.**



16

Required Rescue Team Training

- **Rescue Teams Must Be Trained In The Following Disciplines:**
  - **Personal protective equipment (PPE)**
  - **Rescue equipment**
  - **Duties assigned to the individual**
  - **Simulated rescues from actual or representative spaces on an annual basis (Annual Refresher)**
  - **First aid and CPR.**

17

Awareness Level assists Operations and Technician Level Responders

18

RESPONSE PLAN & INCIDENT COMMAND SYSTEM (ICS)

19

Response Plan Components

Identification of Confined Spaces (NFPA 2500)

- In The Response District
- Industrial, Commercial, And Institutional Areas
- Agriculture
- Marine
- Public Services.

20

Response Plan Components

Department Response Levels (NFPA 2500)

- Primary Response Team
- Backup Response Team
- First Responder
- Support Response
- No Response.

21

Response Plan Components

Personnel Requirements (NFPA 1006)

- Selection of Personnel
- Duties of Individuals And/or Companies
- Training
- Incident Command
- Resources.

22

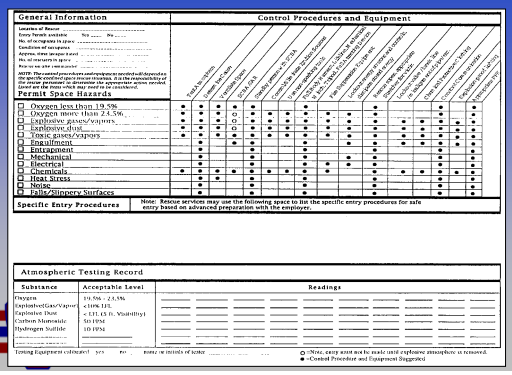
Response Plan Components

Equipment Requirements

- Types of Equipment Needed Based On Response Level
- Availability Of Equipment.

23

Rescue Plan Checklist



General Information

Control Procedures and Equipment

Permit Space Hazards

- Oxygen less than 19.5%
- Oxygen more than 23.5%
- Explosive gases/vapors
- Explosive dust
- Toxic gases/vapors
- Engulfment
- Entrapment
- Mechanical
- Electrical
- Chemicals
- Heat Stress
- Noise
- Falls/Slippery Surfaces

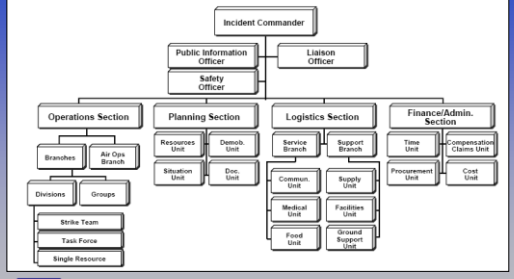
Specific Entry Procedures — Note: Rescue services may use the following space to list the specific entry procedures for safe entry based on advanced preparation with the employer.

Atmospheric Testing Record

Substance	Acceptable Level	Readings
Oxygen	19.5% - 23.5%	
Explosive Gas/Vapor	<10% LEL	
Explosive Dust	< LEL (5 ft. Visibility)	
Carbon Monoxide	50 PPM	
Hydrogen Sulfide	10 PPM	

24

NFA Model ICS



25

Advantages To ICS

- Common Terminology
- Integrated Communications
- Unified Command
- Manageable Span Of Control
- Consolidated Plan Of Action
- Predesignated Incident Facilities
- Modular Organization
- Comprehensive Resource Management.

26

PSYCHOLOGICAL EFFECTS OF CONFINED SPACES

27

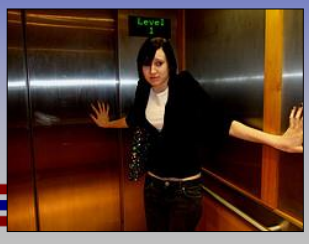
Anxiety

- Distress or An Uneasiness of the Mind
- A Reaction When You Feel Danger From:
  - A Person
  - An Object
  - A Situation
  - An Impulse.

28

Phobias

- Persistent Fear of A Situation Or Object In Which The Level of Fear Is Not In Proportion To Its Actual Seriousness.



29

Panic

- A Sudden Terror
- An Unreasoning, Infectious and Uncontrollable Fear.

30

Causes of Fear / Irrational Behavior In Confined Spaces

- Biological
  - Physical condition
  - Ingested chemicals
  - Oxygen deficiency
- Psychological
  - Subconscious forces
  - Personality disorders / pathological or abnormal behaviors.

31

CONFINED SPACE HAZARDS

32

Hazardous Atmosphere

RESPONSIBLE FOR 80% OF ALL CONFINED SPACE DEATHS

33

Hazardous Atmospheres

- Oxygen-Deficient Atmospheres
- Flammable Atmospheres
- Toxic Atmospheres.

34

Hazardous Atmosphere

- Oxygen - <19.5% or >23.5%
- Flammable Gas Vapor or Mist >10% Of The LEL
- Toxicity Greater Than PEL
- Airborne Combustible Dust At A Concentration That Meets The LEL.

35

Hazardous Atmosphere

- Atmospheric Concentration Of Any Toxin That Could Exceed The Permissible Dose
- Any Other IDLH Condition.

36

What Is...

- LEL?
  - Lower Explosive Limit
- PEL?
  - Permissible Exposure Limit
- IDLH?
  - Immediately Dangerous To Life and Health.

37

Sequence of Testing

- FIRST – Oxygen Level
- SECOND – Flammability
- THIRD – Toxins.

38

GENERAL LIMITS

- Oxygen
  - MIN 19.5% - MAX 23.5%
- Flammability
  - 10% OF THE LEL
- Toxins
  - CO - 35 PPM
  - H_2SO_4 - 10 PPM.

39

OTHER RECOGNIZED HAZARDS

- Electrical
- Mechanical
- Elevation Differences
- Hazardous Materials
- Noise
- Temperature Extremes.

40

Electrical Hazards

41

Mechanical Hazards

42

Elevation Differences

43

Hazardous Materials

44

Noise

45

Temperature Extremes

46

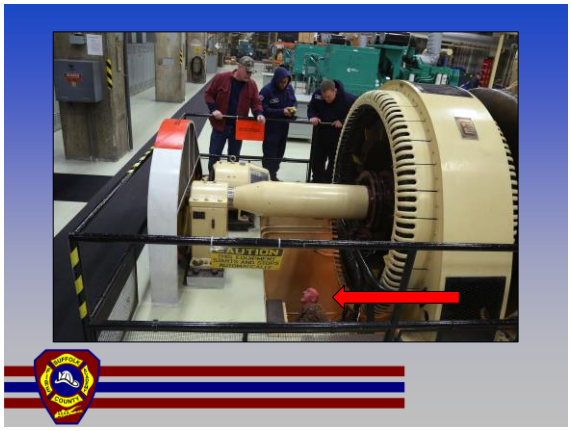
CONFINED SPACE EXAMPLES

47

A Confined Space Is:

- Large Enough To Bodily Enter And Work
- Limited Or Restricted Means Of Entry/Exit
- Not Designed For Continuous Occupancy
- Permit Required
  - Hazardous atmosphere
  - Engulfment hazard
  - Inward converging walls or floors
  - Any other serious safety or health hazards.

48



49

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51

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55

RESCUE SERVICE PERSONNEL SHOULD TREAT EVERY CONFINED SPACE AS A PERMIT REQUIRED CONFINED SPACE

56

FIRST TO ARRIVE

57

First To Arrive

- Recognize A Confined Space and SLOW DOWN!
- Do Not Enter The Space
  - (60% of Deaths = Would Be Rescuers)
- Call For Technical Rescue Team (Early)
- Contact Site Personnel
- Try To Establish Contact With Victim.

58

First To Arrive

- Control Utilities
- Meter The Space
- Determine If The Problem Is
  - Atmospheric – Need for breathing protection
  - Medical – access and exit difficulty
- Identify Best Access Points
- Prepare For Technical Rescue Team Arrival.

59

Action Prior To TRT Arrival

- Secure Incident Scene
  - Would be rescuers (co-workers)
  - General area hazard mitigation
- Gather Information
  - Entry permit
  - Site foreman
  - Bystanders
  - Attendant.

60

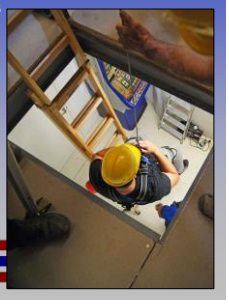
Action Prior To TRT Arrival

- Set-up Perimeter
- Continued Atmospheric Monitoring
- Ventilation
  - Flammable range concerns?
- Begin Required Pre-entry Procedures
- Determine Rescue vs. Recovery.

61

Is A Non-Entry Rescue Possible?

- Victim Wearing A Harness Attached To Retrieval System
- Lower Ladder Into Space
- Lowering A Rope To The Victim That Can Be Hauled.



62

SUMMARY

63

Summary

- 60% of confined space victims are would-be rescuers
- A confined space is 1) large enough for someone to enter and work, 2) has limited/restricted entry/exit, and 3) is not meant for continuous occupancy
- As rescuers we treat all confined space entries as "permitted entries" (as containing increased hazards).

64

Summary Cont'd

- Awareness level responders assist operations and technician level responders
- Hazardous atmospheres contribute to 80% of confined space deaths
- Confined space atmospheres must be continually monitored (Oxygen, Flammability, Toxicity)
- First to arrive to a confined space incident – SLOW DOWN.

65

QUESTIONS???

66