Pennsylvania State Fire Academy

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Minimum Standard for Accreditation (MSA)

March 2000

Course Title: Propane Emergencies Operations (PPEO)

Length of Course: 8 hours **Lecture/Lab Breakdown:** 8/0

Prerequisites: EBM and IAFF or HISI or employer's certification at the OSHA/EPA Haz-Mat First Responder Operations level or greater. **NOTE: *Propane Emergencies Awareness (PPEA)* is NOT a prerequisite for this course; each course in this series is designed to be a stand-alone course. The material in *PPEA* is repeated in *PPEO***

Referenced Text: NPGA ***Propane Emergencies*** (Hildebrand & Noll, 1999) and NPGA ***Propane Emergencies Facilitator's Guide*** (Callan, 1999)

Course Goal: A student completing this course will be able to recognize the hazards involved in a propane/liquefied petroleum gas emergency and take appropriate response actions at the OSHA/EPA First Responder-Operations level.

Description of Course: This program has been designed for fire fighters and related emergency response personnel (such as entry-level haz-mat team members) whose duties meet the OSHA definition of the Operations level of hazardous materials response. Students will learn about the basic properties and hazards of propane and liquefied petroleum gases, containment vessel characteristics, and control strategies for the more common types of propane emergencies (consistent with the limitations of the Operations level).

Description of Methodology to be used: (Brief) Lecture and discussion; limited group activities.

Student Equipment/Supply Needs: Pen/pencil and note-taking materials.

Equipment/Audiovisual/Supply Requirements: Classroom w/ usual amenities; TV/VCR with adequate monitors; computer projection capability for use of CD audiovisual package (or conversion of that package to 35 mm slides or overhead transparencies with appropriate projection equipment); NPGA Facilitator's Kit for this course.

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Course Topical Outline (General):

Time	Content	Instructor Notes
0:30	Unit 1: Welcome/Registration; Introduction & Overview	per ETA/Academy policies
2:00	Unit 3: Physical Properties & Characteristics of Propane	***NOTE:*** Unit 2 material is not taught in the Operations version of the curriculum.
2:00	Unit 4: Non-bulk Container Design & Construction Features	***NOTE:*** Units 5 through 7 are not taught in the Operations version of the curriculum.
2:30	Unit 8: Tactical Response Guidelines for Propane Emergencies	***NOTE:*** Unit 9 is not taught in the Operations version of the curriculum.
1:00	Video	

Competency Evaluation Mechanism:

- Direct questioning by instructor during course of class;
- Instructor observation/feedback of student performances during group activities;

Course Objectives (Learning Outcomes):

Upon completion of this course, the student will be able to correctly and, where appropriate, safely:

1.1 Describe the scope and target audience of this course.
1.2 Identify the key players who may become involved in a major propane emergency and explain their role in resolving the emergency.
3.1 List the two major flammable gases extracted in the Liquefied Petroleum Gases (LPG) Industry.
3.2 Describe the two main reasons for odorizing propane.
3.3 Identify 5 basic characteristics of LP gases.
3.4 Describe the three ways propane behaves when stored in a closed container.
3.5 Describe the relationship between heat, temperature, and boiling point as it relates to the storage of propane in a closed container.
3.6 List the 5 basic symptoms of carbon monoxide poisoning.
3.7 List the basic products of incomplete combustion of propane.
3.8 Describe the hazards of aldehydes as they relate to incomplete combustion of propane.

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Course Objectives (Learning Outcomes) (continued):

3.9 Define the following physical and chemical properties of propane and explain their significance in an emergency.
- 3.9.1 Specific gravity
- 3.9.2 Vapor density
- 3.9.3 Boiling point
- 3.9.4 Expansion ratio
- 3.9.5 Flammable limits
- 3.9.6 Ignition temperature

4.1 Define the following terminology as it relates to propane containers.
- 4.1.1 Container
- 4.1.2 Non – bulk packaging
- 4.1.3 bulk packaging
- 4.1.4 Fixed containers

4.2 Describe the following categories of propane containers.
- 4.2.1 DOT portable cylinders
- 4.2.2 DOT portable tanks
- 4.2.3 ASME mobile motor fuel tanks
- 4.2.4 ASME stationary tanks

4.3 Describe the following basic features of a propane tank.
- 4.3.1 Basic storage container
- 4.3.2 Pressure regulators
- 4.3.3 Pressure relief devices

4.4 Describe the following basic categories of DOT cylinders.
- 4.4.1 Portable service cylinder.
- 4.4.2 Exchange service cylinder
- 4.4.3 Motor fuel cylinder
- 4.4.4 Stationary service cylinder

4.5 Describe the difference between a DOT motor fuel tank and an ASME motor fuel tank.

4.6 List the basic cylinder markings found on DOT cylinders.

4.7 Describe the following basic features of a DOT portable tank.
- 4.7.1 Tank openings and valves
- 4.7.2 Mounting hardware
- 4.7.3 Data plate information

4.8 Describe the following applications of ASME motor fuel cylinders.
- 4.8.1 Recreational vehicles
- 4.8.2 Lift trucks
- 4.8.3 Motor fuel tanks for road vehicles

4.9 Describe the basic features of ASME motor fuel tanks

8.1 Describe the concept of hazard assessment and risk evaluation as it applies to propane emergencies.

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Course Objectives (Learning Outcomes) (continued):

8.2 Given a scenario involving propane, identify and describe the critical safety considerations to be evaluated, including:

- 8.2.1 Potential for multiple hazards.
- 8.2.2 Risk of container failure.
- 8.2.3 Vulnerability to external heating.
- 8.2.4 Requirements for adequate water supply.
- 8.2.5 Risks from secondary exposures.
- 8.2.6 Risks from pressure-fed fires.
- 8.2.7 Risks from exposure to liquid propane.
- 8.2.8 Risks from confined spaces.
- 8.2.9 Protective clothing and equipment requirements.

8.3 Describe the basic tactics for managing the following types of propane emergency scenarios.

- 8.3.1 Propane cylinder overfill and release inside a building.
- 8.3.2 Removing exposed tank from a building on fire.
- 8.3.3 Controlling a propane cylinder fire outside of a building.

Questions/Comments: Rita Wessel, Curriculum Specialist: Extension 106
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