Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG) Marine Emergencies

An emergency incident involving a gas vessel at sea, transiting a channel or canal, or while operating at a marine terminal will challenge a community's emergency response agencies, their port authority partners, marine industries and other key stakeholders. How well they have anticipated such threats and challenges will have a direct impact on the community's ability to deal with it successfully. The LNG/LPG Marine Emergencies provides responders as well as land-based firefighters and fire officers with training on how to effectively evaluate and deal with utilizing a NIMS ICS to a shipboard fire or emergency aboard a marine vessel and/or within the nationally defined port area.

Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG) Marine Emergencies builds upon skills learned in Command Strategies and Tactics for Marine Emergencies (CSTME). CSTME is a two-day course that introduces participants to the common and often unexpected events that can occur in any port. CSTME was developed as a cooperative effort between Tri-state Maritime Safety Association (TMSA) and Maine Maritime Academy (MMA).

LNG/LPG Marine Emergencies is designed to orient response personnel with the properties, hazards and strategies to deal with incidents involving gas vessels. Gas vessels as some of the most robustly built ships and incidents involving them are very rare. The potential significant impact of an emergency involving one, however, shows the need to adequately prepare for a potential incident. In addition to providing a background on gas vessels, their cargoes, and their potential impacts, the course engages participants within various problem solving activities based upon local jurisdictional and environmental conditions and commercial marine operations, involving realistic scenarios that require participants to fulfill the role of key decision makers. Practical training allows participants to evaluate and use their available response equipment to ensure that existing standard operating guidelines are adequate or require enhancement.

Scenarios are constructed in consultation with clients in advance, to ensure that they meet local training requirements. Scenarios to include:

- Events tailored to local client requirements
- Escalating real-time developments
- Decision analysis and evaluation
- Staff instructors who will monitor progress and guide critique
- Equipment training and evaluation

Liquefied Natural Gas (LNG) and Liquefied Petroleum Gas (LPG) In the Marine Environment

INTRODUCTION:

- Introductions
- General time frames
- Course Manuals
- Lunch, breaks, amenities

Module 1: LNG and LPG Properties and Characteristics

- Properties
  - Appearance
  - Storage and Shipping Conditions
  - Composition
  - Combustion Properties
- Characteristics
  - Vapor Density
  - Vaporization Characteristics
  - Expansion Ratios
  - Spill Characteristics on Land and Water
- LNG and LPG Comparisons

Module 2: Hazards

- Thermal Radiation
- Vapor Clouds and Vapor Density
- Explosive Hazards
- Rollover in Tanks
- Cryogenic Hazards

Module 3: Historical Incidents and LNG Myths

- Historical Incidents
  - Cleveland, OH 1944
  - Staten Island, NY Accident
  - Cove Point, MD, 1979
  - Canvey Island, UK, 1965
  - Algeria, 1977 and 2004
- LNG Myths

Module 4: Fire and Gas Detection Systems

- Point Gas Detection
- Open Path Gas Detection
- Portable Gas Detection
- Vessel fire detection systems

Module 5: LNG and LPG Vessels

- Types of Vessels
- General Ship Layout
- Cargo Tank configurations
- LNG as a fuel
- Fire Detection and Suppression Systems
- Vapor Mist Systems
- Vessel Locations where leaks can occur
- Firefighting capabilities aboard LNG & LPG ships
- LNG/LPG vessel types which may visit the Panama Canal

Module 6: Gas Leaks and Impacts

- LNG Leak
- Detecting LNG leaks
- Vapor cloud formation
- Vapor cloud travel
- Vapor cloud disbursal
- Dangers in area of LNG leak

Module 7: LNG & LPG Fires

- Fires
- Ignition possibilities
- Flame and heat propagation
- Terrorism
    - Historical Events, Lessons Learned
    - Maritime Terrorism
    - Prevention
    - Small Boat Risks
    - Anticipating Unknown Hazards

Module 8: Fire Control Strategies and Methodologies

- Vessel Crews
  - Master Responsibilities
    - Safety of vessel and crew
    - Fires and emergencies on board
    - Vessel firefighting systems - state of readiness
  - Crew Training and Capabilities
    - Ship Systems
    - Personal Protective Equipment
  - Ship Response Tactics
    - Detection
    - Response
    - External Notifications
- Land-based Firefighters
  - Initial Size-up
  - Establishing Command
  - Strategies (Offensive vs. Defensive
  - Incident Priorities
    - Life Safety
    - Incident Stabilization/Protection of Property
    - Environmental Concerns
  - Tactics:
    - ACPFD personnel
    - ACP personnel
    - ACP FiFi Tug Boats
  - Tactical Plans
    - Locks
    - Anchored or Remote
    - Underway
    - Water Supply

Module 9: Coordinated Operations for Fire Protection/Table Top Exercises

- Roles and Responsibilities
- The Incident Commander
- Transitioning to a Unified Command
- Command Posts
- Vessel Fire and Safety Plans
- Incident Action Plans

Module 10: Practical Use of Firefighting Systems

- FiFi Tugs
  - Firefighting Systems
  - Foam Systems
  - Water Mist Systems
- Foam Suppression
  - Portable and Installed
  - Low Expansion
  - Medium Expansion
  - High Expansion
- Dry Chemical