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# Federal Safety & Security Requirements for Onshore LNG Terminals

## DOE LNG Forums

2006

Presented by **Frank Licari**

Staff Cryogenic Engineer

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# Agenda

- PHMSA - A New DOT Administration
- Safety & Security Review Process for Onshore Terminals
- Safety & Security Regulations
- LNG Application Review
- Federal Inspections After Startup
- LNG Terminal Safety Record
- Questions



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# What is PHMSA?

- A Union of:
  - **Office of Pipeline Safety**
  - **Office of Hazardous Materials Safety**
- Established under the Norman Y. Mineta Research and Special Programs Improvement Act (P.L. 108-426) of November 2004
- Committed to:
  - **Ensuring the safe and secure transportation** of energy products, chemicals and other hazardous materials
  - **Promoting transportation solutions that enhance communities and protect the natural environment**





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## Why Is PHMSA Important in LNG?

- Its Safety Regulations Govern Terminals
- PHMSA Enforces Operator Compliance
- It Investigates Terminal Incidents
- Everyone Here Is a PHMSA Stakeholder



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# Safety & Security Review of Onshore Terminals Is a Cooperative Process





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## 3 Federal Agencies Address Safety & Security Concerns

- Pipeline and Hazardous Materials Safety Administration (PHMSA)
- Federal Energy Regulatory Commission (FERC)
- U.S. Coast Guard (USCG)



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# Agencies' Roles

## PHMSA:

Prepares & Enforces LNG Safety Regulations in 49 CFR Through Rulemakings, Waivers, and Interpretations

## FERC:

Ensures LNG Terminals Are Sited, Designed, & Constructed to Protect Public Safety & Environment

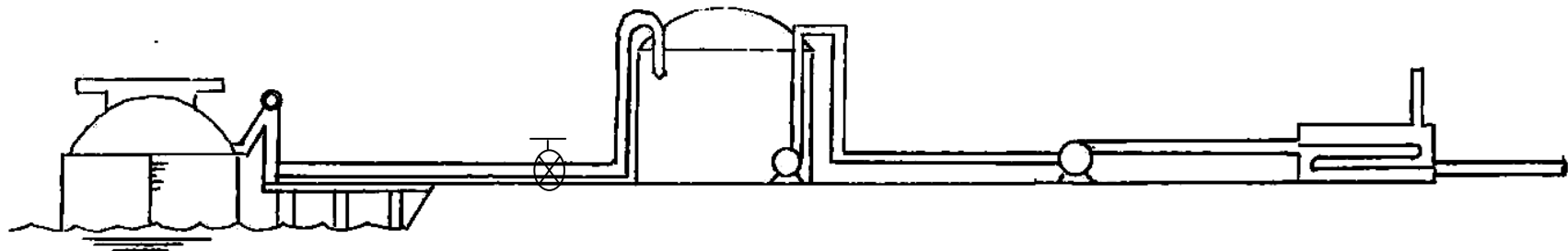
## USCG:

Prescribes Security, Reviews Marine Design, & Assesses Waterway Suitability (WSA)

## All Three:

Inspect Terminal Operations After Startup

# Agencies' Jurisdictions



FERC – Section 3 of the Natural Gas Act

Coast Guard – 33 CFR Part 127

PHMSA – 49 CFR Part 193 Safety Standards

Coast Guard – 33 CFR Part 105 Facility Security





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# Together PHMSA, FERC, & USCG Confirm All Terminals

- Meet Federal Safety Requirements
- Operate Safely With Tight Security
- Do Not Harm the Environment



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# Terminal Safety & Security Begin With The Code of Federal Regulations





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# PHMSA Regulations

## Establish Safety Standards

- 49 CFR Part 193 Governs Terminal:
  - Incident Reporting & Investigation
  - Protective Systems & Safety Devices
  - Siting, Impoundment, & Storage Tanks
  - Design, Construction, & Operations
  - Fire Protection & Security

Incorporates NFPA 59A 2001 in Selective Areas



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## **33 CFR GOVERNS MARINE ACTIVITIES**

- **LNG Vessel Operations in Part 127**
- **Dockside Loading & Unloading in Part 127**
- **Terminal Security in Part 105**





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# TERMINAL SECURITY RULES INCLUDE

## International Treaty:

*International Ship & Port Facility  
Security (ISPS) Code*

## U.S. Law:

*Maritime Transportation Security  
Act (MTSA) of 2002*

## U.S. Regs (33 CFR 105):

- *Facility Security Assessment*
- *Facility Security Plan*
- *Facility Security Officer*





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**U.S. COAST GUARD**



# TERMINAL SECURITY RULES INCLUDE

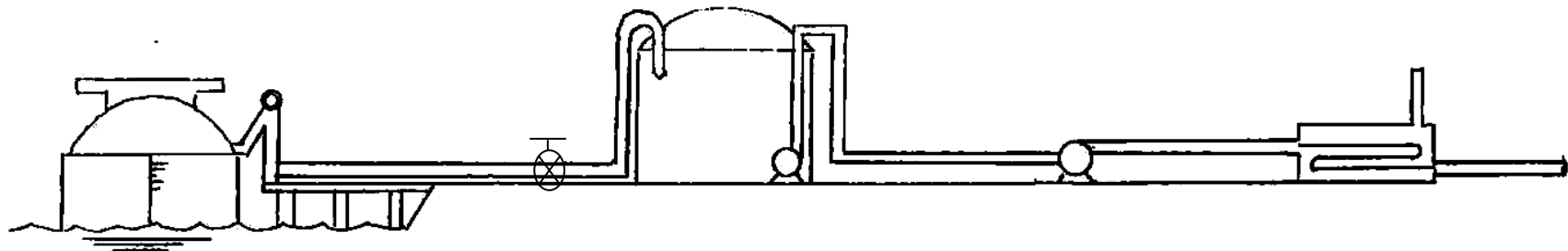
## U.S. Regs (33 CFR 105) continued...

- *Training, Drills & Exercises*
- *Security measures for:*
  - *Access Control*
  - *Restricted Areas*
  - *Handling of Cargo*
  - *Delivery of Vessel Stores & Bunkers*
  - *Monitoring of the facility*



FERC

# Application Review Validates LNG Terminal Safety & Security



FERC – Lead Agency for Reviewing Application & Preparing Environmental Impact Statement

USCG – 33 CFR Part 127/NVIC

PHMSA – 49 CFR Part 193 Safety Standards

USCG – 33 CFR Part 105 Facility Security

*Office of Energy Projects*

# FERC's Safety Review Examines



- 
- Compliance with 49 CFR Part 193 and NFPA 59A
  - Pipeline Design
  - Cryogenic Design and Technical Review – Report 13
  - Exclusion Zones – Thermal Radiation and Flammable Vapor
  - Seismic Design Review





# Pipeline Design Considerations



- 
- Alternative Routings & Construction
  - Class Location (Population Density)
  - Reliability, Operability, & Safety of Pipeline Facilities

# Cryogenic Design Review



- 
- Process Flow and Material Balance
  - Piping and Instrumentation Diagrams
  - LNG Storage Tank Design
  - Hazard Detection and Emergency Shutdown Systems
  - Hazard Control – Fire Water, Dry Chemical, High Expansion Foam
  - Draft Guidelines for Report 11 and 13

# FERC Safeguards for Terminal Systems

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- Vapor & Fire Detection If Gas Vents
- Protective Systems for Vaporizers
- Equipment Isolation Capability
- Gas Detection at Combustion Air Intakes
- Contingency Plans for Outer Tank's Loss of Containment
- Seismic Shutdown System
- Inner Tank Movement Indicators
- Tank Settlement Limits

# Reviews of Marine Safety & Terminal Security Include



- Compliance with 33 CFR Part 127
- Letter of Intent to Initiate U.S. Coast Guard Letter of Recommendation
- June 2005 NVIC 05-05 (WSA)
- Marine Safety Analysis – Thermal Radiation & Flammable Vapor Hazards
- Vessel Traffic Congestion
- Compliance with 33 CFR Part 105





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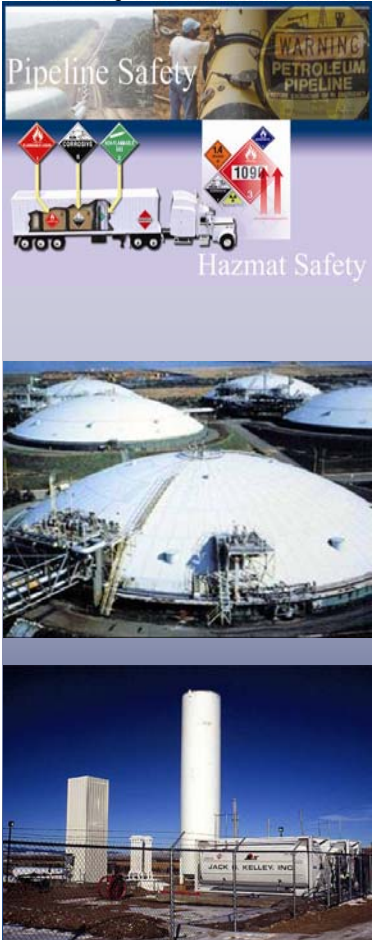
# Federal Inspections Protect Public Safety, Security, & Environment, After Startup





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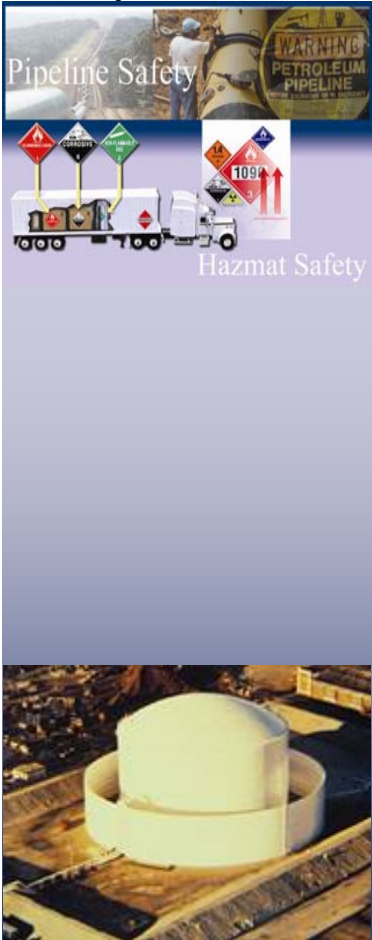
# PHMSA Inspectors Ensure LNG Operations Are Safe

- Review Facility Procedures & Changes
- Scrutinize Records & Their Retention
- Examine Facility's Condition
- Follow 21 Page Inspection Guideline  
(see <http://ops.dot.gov/library/forms/forms.htm>)



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# FERC Inspectors

- Assess Effectiveness of Terminal Design for Reliability, Operability, & Safety
- Confirm Operator Complies with All Safety & Environmental Conditions in FERC's Permit
- Conduct Annual Terminal Inspections



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# USCG Inspections Include

- Reviews of All Marine Transfer & Dockside Systems<sup>1</sup>
- Testing of Critical Safety Systems<sup>1</sup>
- Terminal Security Reviews
- Vessel Examinations<sup>2</sup>
  - Could Be Each Time They Enter U.S. Waters

<sup>1</sup> [www.uscg.mil/d9/sault/mso/prevention/cg%2D5562a%28rev%206%2D96%29.pdf](http://www.uscg.mil/d9/sault/mso/prevention/cg%2D5562a%28rev%206%2D96%29.pdf)

<sup>2</sup> [www.uscg.mil/tcyorktown/mschools/MII/840/CG-840%20LOC%201.pdf](http://www.uscg.mil/tcyorktown/mschools/MII/840/CG-840%20LOC%201.pdf)





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# Safety, Security, & Environmental Assurance After Every Inspection Cycle





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# U.S. LNG Terminal Safety<sup>1</sup>

All Operated  
Without an Injury or Incident  
For Over 25 Years!

<sup>1</sup> Reference LNG Safety & Security, Center for Energy Economics, October 2003, pg. 78, [[www.beg.utexas.edu/energyecon/lng/](http://www.beg.utexas.edu/energyecon/lng/)].



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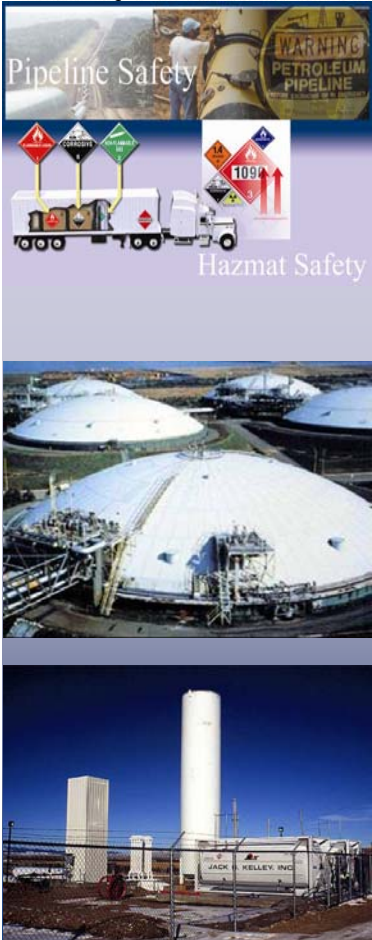
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# PHMSA Inspectors Ensure LNG Operations Are Safe

- Review Facility Procedures & Changes
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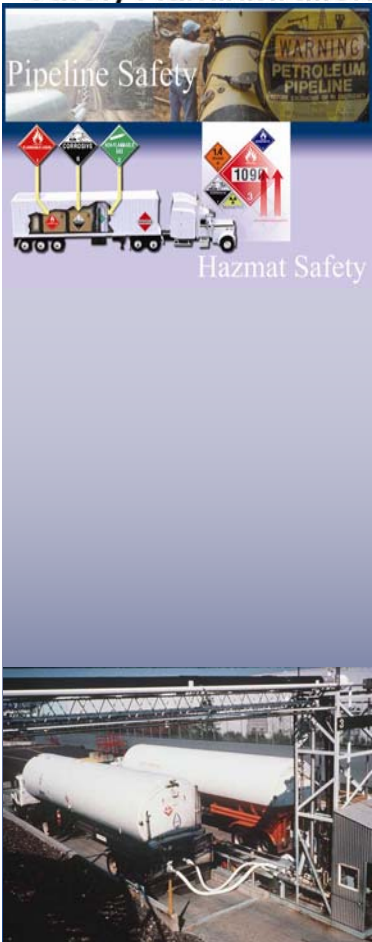
# Procedures & Their Changes

- Operational, Emergency, & Security
- Incident/Accident Investigation
- Corrosion Control & Maintenance
- Equipment Inspection & Testing



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# Facility Records

- Incident Reporting
- Emergency Responder Meetings
- Safety System Functionality
- Fire Protection Systems
- Storage Tanks & Transfer Hoses
- Maintenance, Inspection, & Repair
- Training & Qualification



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# Inspection Guideline

**STANDARD INSPECTION REPORT OF AN LNG FACILITY**  
Unless otherwise noted, all code references are to 49 CFR 192.103. S - Satisfactory U - Unsatisfactory N/A - Not Applicable H/C - Not Checked  
 If an item is marked U, H/A, or H/C, an explanation must be included in this report.

FIELD REVIEW:		Sa	Ua	N/Aa	H/Ca
219(a)	Backup power supply for communication systems	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2407(a)	Excessive external lighting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2407(b)	LNG plant ground maintenance and upkeep (grass, brush, etc.)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2409	Support systems (foundations, pipe and support, etc.)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2411(b)	Access routes for fire control equipment kept clear of snow, etc.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2413	Auxiliary power supply	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2419(a)	Control systems calibration	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2421(b)	Transfer loads	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2423	Storage tanks	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2427	Atmospheric corrosion	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2435	Cathodic protection (CP work)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(923)	ESD system initiation devices and ESD Station location	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(924)	Operating instructions attached at the location of control to fire control equipment	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(931)	Monitor enclosed buildings that have a potential for flammable refrigerant spill and fire	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(932)	Continuously monitored low-temperature sensors to control an alarm or flammable gas detection system (to activate at no more than 2% LEL) to activate an audible and visual alarm	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(933)	Fire detection system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(948)	Fire protection water system	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(951)	Possible fire extinguishers	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(953)	Fire extinguisher (at least 10 B (3.1) on each remote truck assigned to the plant)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(971)	Protective clothing equipment (including eye gear, gloves, safety glasses, face shield, and coveralls or long-sleeve shirt)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
NEPA-99A(974)	Possible gas detectors available (at least 1)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2905	Protective enclosures	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2911	Lighting	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2915	Alternative power sources	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2917	Warning signs along fence or boundary, visible at 100 ft at night	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Comments:

21

Form-4 Standard Inspection Report for an LNG Facility (Rev. 02/04/05 through Amend. 1/9/13)

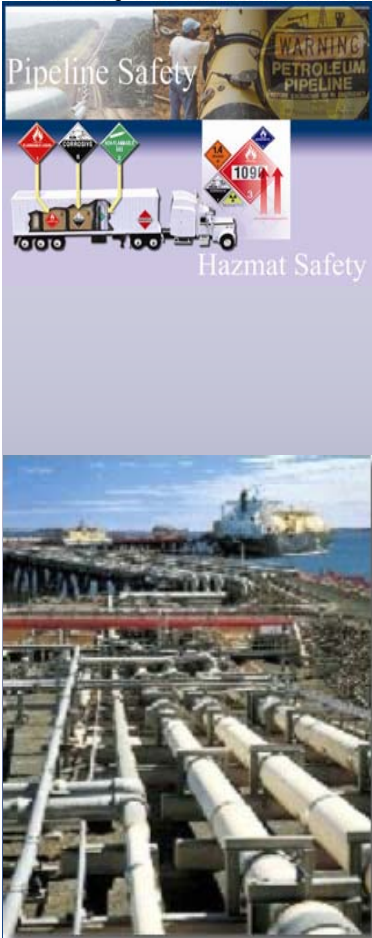
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# Annual USCG, Dockside Inspections Include<sup>1</sup>

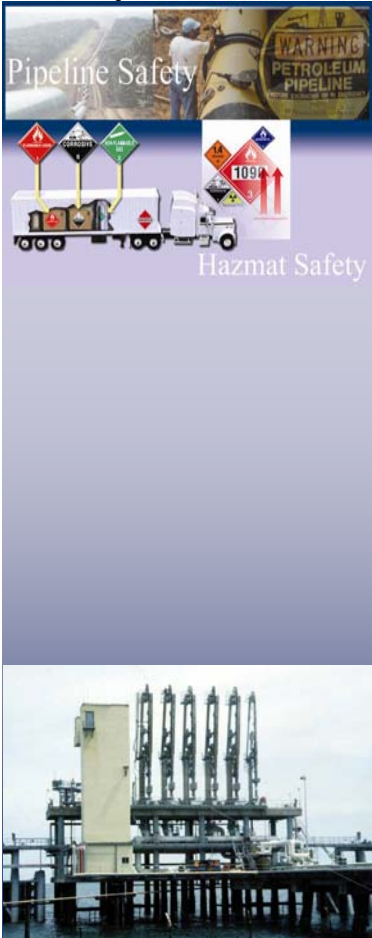
- Alarms & Emergency Shutdowns
- Emergency, Operations, & Maintenance Procedures
- Terminal Security & Marine Transfer Communications
- Operations, Maintenance, Testing, & Inspection Records
- Training/Qualification/Certification of Operator Personnel for Shoreside Inspections & Transfers
- Firefighting Equipment & Emergency Outfits
- USCG Letters of Intent & Hot Work Permits
- Marine Transfer Area Piers, & Wharves

<sup>1</sup> [www.uscg.mil/d9/sault/mso/prevention/cg%2D5562a%28rev%206%2D96%29.pdf](http://www.uscg.mil/d9/sault/mso/prevention/cg%2D5562a%28rev%206%2D96%29.pdf)



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# Annual USCG, Dockside Inspections Test<sup>1</sup>

- Emergency Shutdowns
- Sensing & Alarm Systems
- Isolation Valve Actuation
- Emergency Power & Lighting
- Fire System Capacity & Pressure
- Marine & Terminal Communications

<sup>1</sup> [www.uscg.mil/d9/sault/mso/prevention/cg%2D5562a%28rev%206%2D96%29.pdf](http://www.uscg.mil/d9/sault/mso/prevention/cg%2D5562a%28rev%206%2D96%29.pdf)



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# USCG Vessel Examinations<sup>1</sup>

- Interval
  - Is One Year or Less
  - Could Be Each Time Vessels Enter U.S. Waters
- Certificates & Documents
  - International Vessel Certification
  - Manning Certificates
  - Vessel Logs & Manuals
- General Requirements
  - Safety & Life Saving
  - Fire Protection
  - Pollution Protection

<sup>1</sup> [www.uscg.mil/tcyorktown/mschools/MII/840/CG-840%20LOC%201.pdf](http://www.uscg.mil/tcyorktown/mschools/MII/840/CG-840%20LOC%201.pdf)



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# USCG Vessel Examination<sup>1</sup>

- **Cargo Operations for Liquefied Gas Carriers**
  - Safety Devices & Transfer Hoses
  - Intrinsically Safe Electrical Systems
  - Sensing & Alarm System Functional Tests
  - Safety Equipment
- **Cargo Operations for LNG Carriers**
  - Vapor Control Systems
  - Liquid Overfill Protection
  - Vapor Overpressure & Vacuum Protection
  - Operational Test of Isolation Valves
  - Emergency Shutdown Test
  - Overfilled Tank Alarm Test
  - Cargo Operations for LNG Carriers

<sup>1</sup> [www.uscg.mil/tcyorktown/mschools/MII/840/CG-840%20LOC%201.pdf](http://www.uscg.mil/tcyorktown/mschools/MII/840/CG-840%20LOC%201.pdf)

# EXTRA OVERHEADS