



US DOT Pipelines and Hazardous Materials Safety Administration
and
National Association of Pipeline Safety Representatives

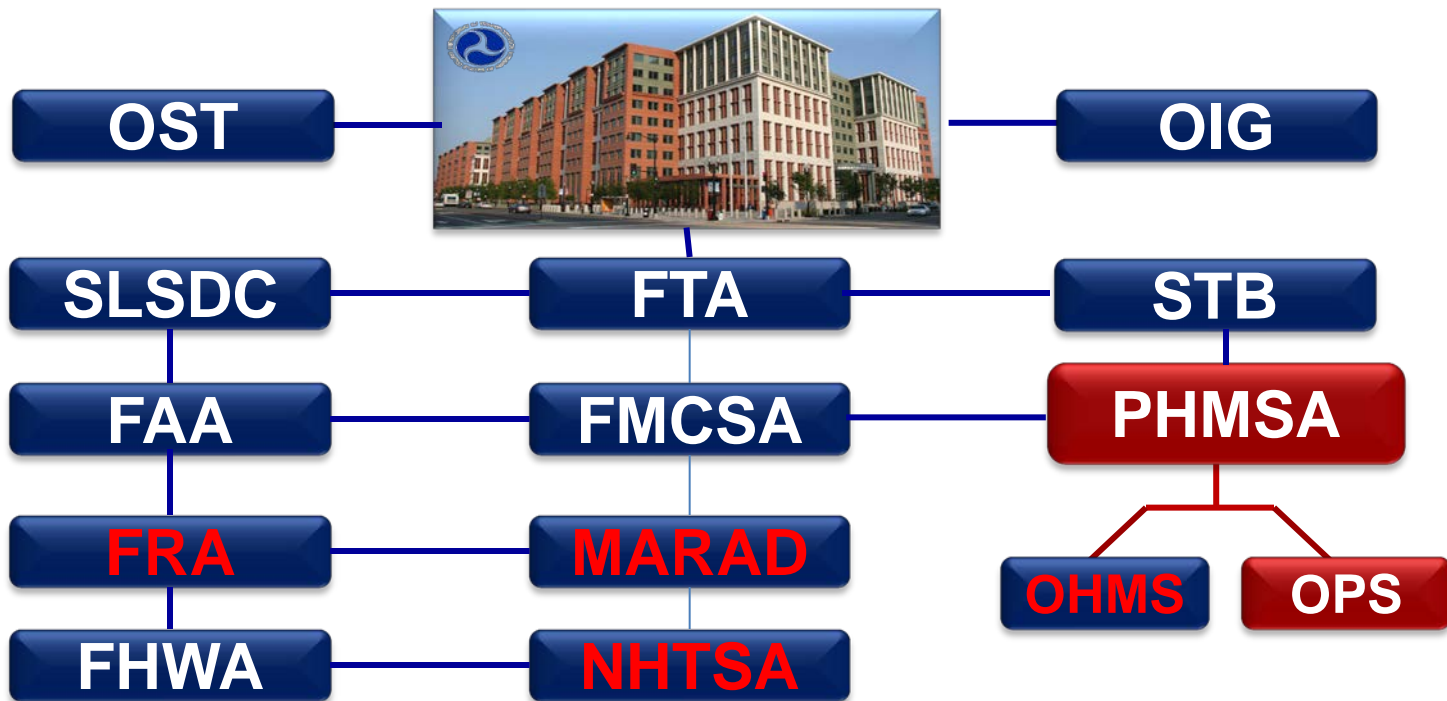
Liquefied Natural Gas Workshop

US DOT Headquarters
West Building Atrium
1200 New Jersey Ave. SE
Washington, D.C.

May 17-18, 2016



U. S. Department of Transportation (DOT)



Mission and Vision

Our mission is to protect people and the environment by advancing the safe transportation of energy and other hazardous materials that are essential to our daily lives.

Our vision is the most innovative transportation safety organization in the world.



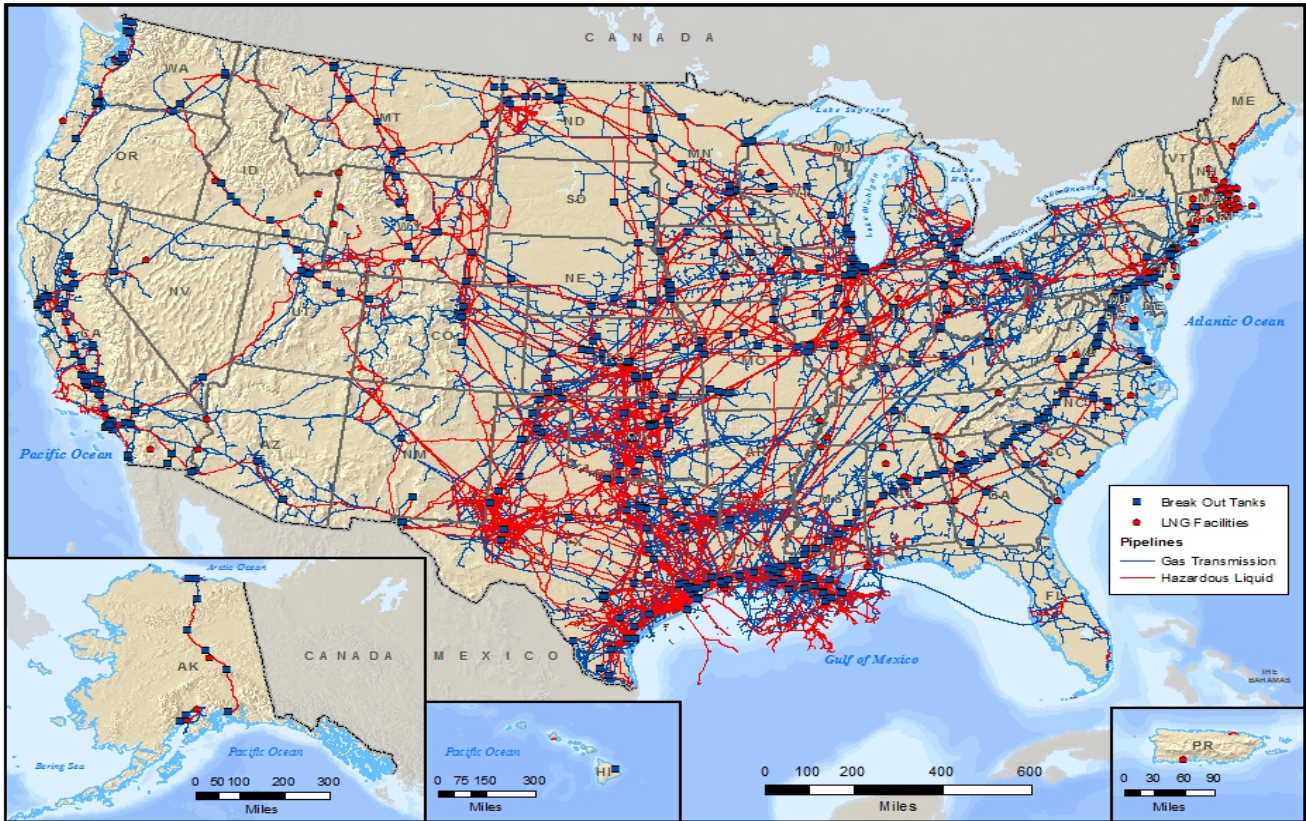
What PHMSA OPS Regulates

System Type	Miles	% Miles	# Operators
Hazardous Liquid	199,334 7,677 Tanks	7%	456
Gas Transmission	301,810	11%	1,020
Gas Gathering	17,663	1%	367
Gas Distribution (Mains & Services)	2,168,599	81%	1,373
Total	2,687,406	100%	Some Operators have multiple System Types
Liquefied Natural Gas	115 Plants	205 Tanks	83



What PHMSA OPS Regulates

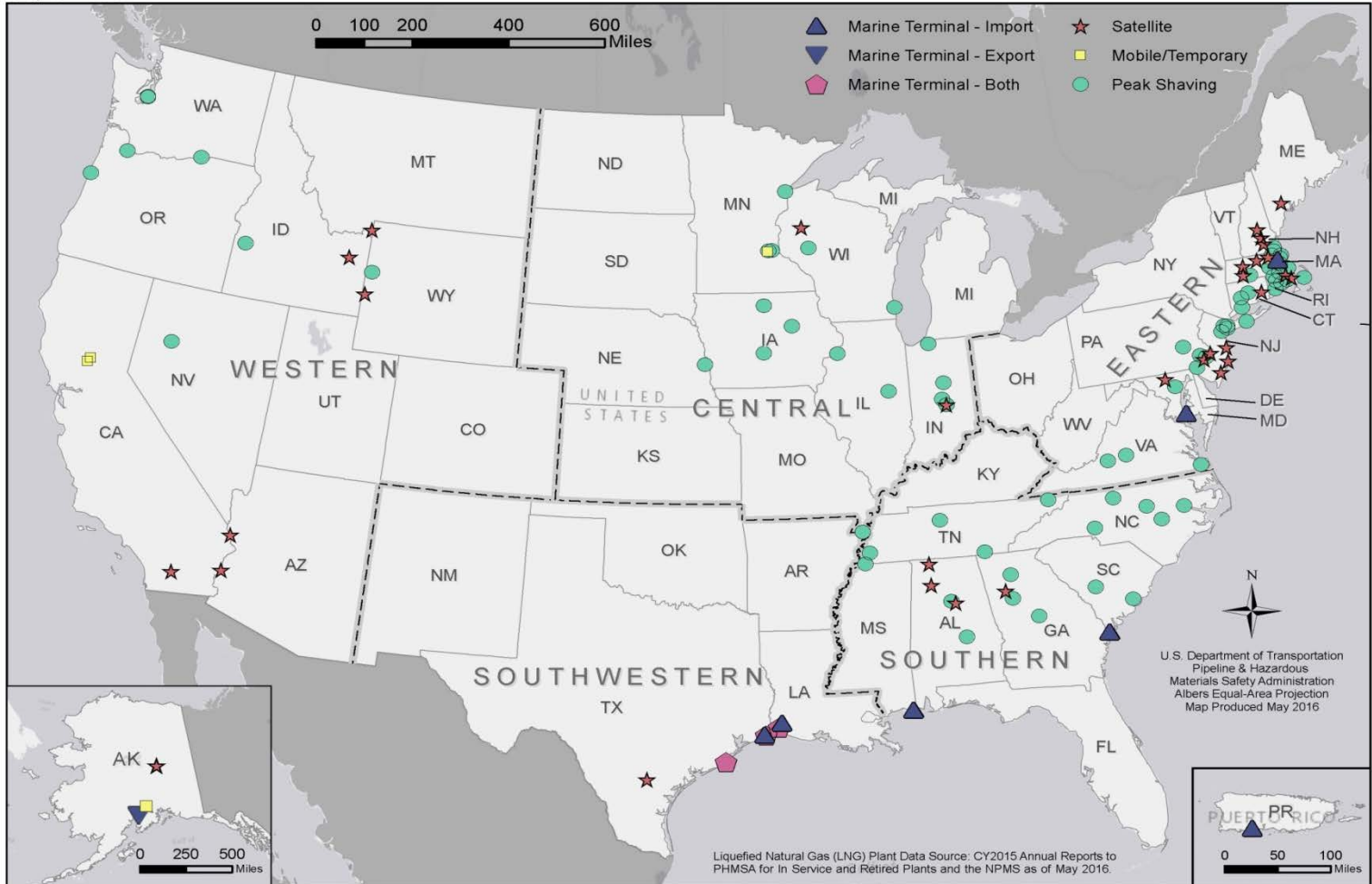
Gas Transmission and Hazardous Liquid Pipelines in the United States
National Pipeline Mapping System



U.S. Department of Transportation, Pipeline and Hazardous Materials Safety Administration
Projection: Albers Equal Area Conic
Map created December, 2014

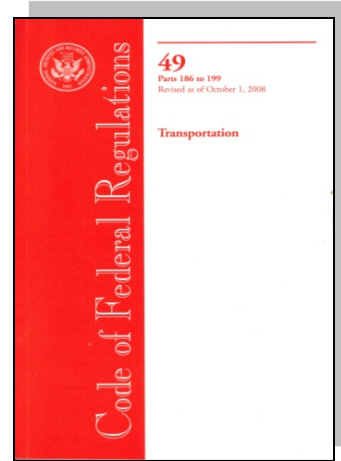


LNG Plants Connected to Natural Gas Pipeline Systems



Some of PHMSA's Roles and Responsibilities

- **Development and Implementation of Safety Regulations: 49 CFR Parts 190-199, including**
 - Part 192: Transportation of Natural and Other Gas by Pipeline
 - Part 193: LNG Facilities: Federal Safety Standards
 - Part 195: Transportation of Hazardous Liquids by Pipeline
- **Perform Comprehensive Inspections**
- **Monitor and Enforce Compliance**
 - Require remedial actions
 - Assess civil penalties
 - Criminal referral



Underlying Principles

- Operator responsibility to **understand and safely manage** the risks (safety conditions) associated with their pipelines
- PHMSA's primary role is to establish minimum safety standards (regulations) and to verify that the operators perform to these standards
- PHMSA also strives to impact operator performance beyond mere compliance with the regulations
- Focus is on PERFORMANCE



Where We Are Located



Purpose of LNG Workshop

- Listen to input from stakeholders:
 - New technologies, standards, and safety advancements
 - Process safety management
 - Challenges due to dated regulations
- Communicate:
 - Lessons learned from LNG incidents
 - Plan to update CFR 49 Part 193



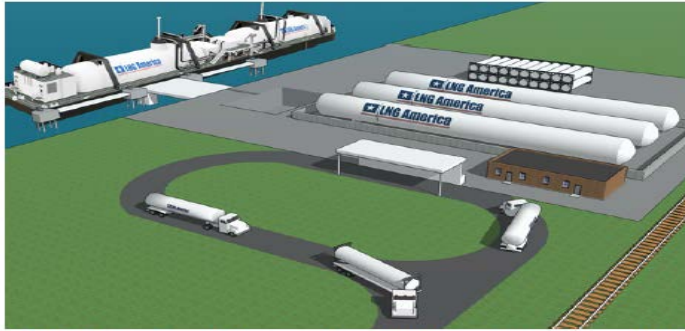
What is Regulated under Part 193?

- **Rule of Thumb:** An LNG plant is regulated under 49 CFR Part 193 if it either receives from or delivers to a **49 CFR Part 192 pipeline**.
- **Exceptions:**
 - (1) LNG facilities used by **ultimate consumers** of LNG or natural gas (e.g. for a company's own trucking fleet).
 - (2) LNG facilities used in the course of **natural gas treatment or hydrocarbon extraction that do not store LNG**.
 - (3) In **marine cargo transfer systems** and associated facilities(except siting)
 - (4) Any LNG facility located in **navigable waters**



Not Regulated by Part 193

LNG Depots



LNG Marine Depot (Source: Used with permission from LNG America)

LNG by vessel, truck, or rail is an alternative to supply locations where **no pipeline infrastructure** is available or the LNG is used as a final product.

LNG Refueling Stations



LNG Fueling Station (Source: Used with permission from Quest Consultants Inc.)

LNG facilities operate as **refueling facilities for vehicles** that use LNG for fuel. The vehicles range from fleets of public buses, to ground support vehicles at airports, to railroad locomotives. The LNG is delivered by truckload.



49 CFR Part 193: LNG Facilities

First promulgated during Peak Shaving era: 1980



Evolving LNG Supply Chain

Due to abundant natural gas/stricter emissions regulations.



**Peak Shaving
(FERC & Non-FERC)**



**Marine Import→Export
(FERC Jurisdiction)**



**Small-scale
(Non-FERC)**

-1960—1970—1980—1990—2000—2010—→



LNG Small Scale Liquefaction Modular Design



LNG Fuel for Transportation



Marine Bunkering



Rail



Trucking/Heavy
Equipment



What Makes Export Different –

Size of LNG Liquefaction Trains; Quantity of Heavy Hydrocarbons

Sabine Pass – Cheniere LNG During Construction Schematic



Refrigerants

- ◆ Methane
- ◆ Ethane
- ◆ Propane
- ◆ Ethylene
- ◆ Nitrogen

Liquefaction needed for (1) storage and (2) transport.

Agency Coordination

- Small-scale LNG often crosses jurisdictions (e.g. pipeline, truck, train, ship, etc.)
- Coordinating activities :
 - Federal agencies (FERC, DOE, FAA, FRA, MARAD, USCG, etc.)
 - State and local agencies



Plan to Update CFR 49 Part 193

- ✓ Hold public meeting in 2016
- Review standards incorporated by reference
- Consider new types of LNG facilities
- Assess newer technologies/safety advancements
- Evaluate incident data & age of facilities
- Notice of Proposed Rulemaking



WHO IS INTERESTED IN PART 193?



Registered Federal & State Agencies

- **US Department of Transportation (DOT)**
 - Pipeline and Hazardous Materials Safety Administration
 - Office of Pipeline Safety (PHMSA OPS)
 - Office of Hazardous Materials (PHMSA OHMS)
 - PHMSA OPS State Pipeline Safety Partners from:
AL, AR, CO, CT, DE, GA, IA, IL, KY, MN, NE, NJ, NY, PA, RI, SC, TX,
 - Federal Railroad Administration (FRA)
 - Maritime Administration (MARAD)
 - National Highway Traffic Safety Administration (NHTSA)
- Federal Energy Regulator Commission (FERC)
- Department of Energy (DOE)
- United States Coast Guard (USCG)
- Bureau of Land Management (BLM)
- Homeland Security Studies and Analysis Institute (DHS)
- National Transportation Safety Board (NTSB)
- Environmental Protection Agency (EPA)
- Department of the Interior (DOI), Office of Environmental Policy and Compliance
- Congressional Records Service (CRS)
- Oak Ridge National Labs (ORNL)
- Department of Agriculture (USDA)
- Non US
 - House Safety Laboratory (HSL)
 - Environment and Climate Change Canada
 - Technical Standards and Safety Authority (TSSA)
 - BC Oil and Gas Commission
 - Lloyd's Registry (Certifying Authority for LNG Facilities for the Province of Nova Scotia)



Registered Non-Government

Technical Committees

- NFPA 59A Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG) Committee members
- Z276 Liquefied natural gas (LNG) - Production, storage, and handling (Canada)
- Fire/Emergency Response
- Public
- Associations (AGA, API, CLNG, NASFM)
- Representatives of Rail & Maritime
- Labs
- LNG Operators (>45)
- Risk & Safety Management
- Engineering Consultants
- Manufacturers
- Insurance
- Law Firms



Current PHMSA Research: LNG

- Comparison of Exclusion Zone Calculations and Vapor Dispersions Modeling Tools (CH-IV International)
- Statistical Review and Gap Analysis of LNG Failure Rate Table (Gas Technology Institute)
- **R&D Forum:** Fall 2016, LNG Working group





Know what's below.
Call before you dig.



Thank you

phmsa.dot.gov

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U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

To Protect People and the Environment From the Risks of
Hazardous Materials Transportation



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