

Natural Gas Liquid (NGL) Pipelines & How They Are Regulated for Safety

CCATO Forum on Pipeline Safety and NGL Pipelines
East Goshen Township Building, West Chester, PA
June 17, 2015



U.S. Department of Transportation
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Presentation Overview



- **How Pipelines are Regulated for Safety**
- **Hazardous Liquid Pipelines**
- **Natural Gas Liquid Pipelines**
- **Preparedness - Important Things to Know**
- **Available Resources and Links**



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Office of Pipeline Safety Mission

Office of
Pipeline Safety



“To ensure the safe, reliable, and environmentally sound operation of the Nation’s pipeline transportation system.”

<http://phmsa.dot.gov/pipeline>



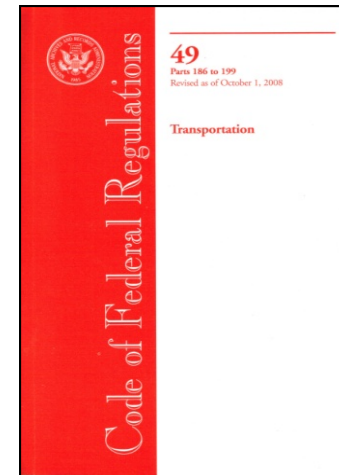
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Some of PHMSA's Roles and Responsibilities

- Development and implementation of federal pipeline safety regulations
- Ensure compliance with federal pipeline safety regulations
 - Perform comprehensive inspections
 - Investigate pipeline accidents
 - Monitor and Enforce Compliance
 - Require remedial actions
 - Assess civil penalties
 - Initiate criminal action



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What PHMSA Does Not Do

- Approve pipeline projects
- Approve pipeline routes (rights-of-way)
- Issue pipeline operating permits
- Regulate commercial or residential development along pipelines



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Regulatory Requirements

Title 49 Code of Federal Regulations

- Part 190: Pipeline Safety Programs/Rulemaking
- Part 191: Reporting Requirements
- Part 192: Natural Gas Pipelines
- Part 193: LNG Facilities
- Part 194: Oil Spill Response Plans (OPA)
- **Part 195: Hazardous Liquid Pipelines**
- Part 198: State Grants
- Part 199: Drug and Alcohol



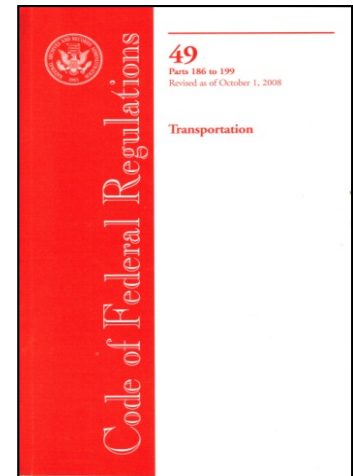
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Pipeline Regulations

- Hazardous Liquid and Gas Pipeline Regulations address:
 - Materials
 - Design
 - Construction
 - Operations and Maintenance
 - Emergency preparedness plans
 - Public awareness programs
 - Damage prevention programs
 - Personnel Qualification, Drug and Alcohol programs
 - Integrity management programs, more....



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Role of State Pipeline Regulators

- Federal pipeline safety laws – Congress determined that pipeline safety best promoted through PHMSA's minimum Federal standards.
- To ensure compliance with these standards, Federal safety laws (49 U.S.C. §§60101, *et seq.*) allow PHMSA and state regulators to share inspection and enforcement responsibilities (subject to PHMSA certification or agreement).



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Jurisdiction in PA

- Hazardous Liquid Pipelines
 - Intrastate – Federal (PHMSA)
 - Interstate – Federal (PHMSA)
 - Gathering – Federal (PHMSA)
- Natural Gas Pipelines
 - Interstate Transmission – Federal (PHMSA)
 - Intrastate Transmission – State (PA PUC)
 - Gathering – State (PA PUC)
 - Distribution - State (PA PUC)



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Hazardous Liquid Pipelines

Hazardous liquid pipelines, as defined in federal regulations, carry:

- **Crude oil**, with widely varying densities, viscosities, sulfur contents, and other properties, including bitumen (an extra heavy crude oil), which is typically diluted with condensates to make it flow through pipelines. “Sweet” crude refers to crude that contains little or no sulfur, while “sour” crude contains high concentrations of sulfur or hydrogen sulfide.
- **Refined petroleum products**, including gasoline, diesel, jet fuel, and home heating oil.
- **Highly Volatile Liquids** such as propane, butane, ethylene, condensates
- **Carbon dioxide**
- **Anhydrous Ammonia**

→ Can rapidly change from liquid to gaseous states when released from pipeline

PHMSA’s regulatory authority applies to pipeline facilities and the transportation of hazardous liquids or carbon dioxide associated with those facilities in or affecting interstate or foreign commerce, including pipeline facilities on the Outer Continental Shelf.



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§195.1 Which pipelines are covered by this part?

- (a) Covered. Except for the pipelines listed in paragraph (b) of this Section, this Part applies to pipeline facilities and the transportation of hazardous liquids or carbon dioxide associated with those facilities in or affecting interstate or foreign commerce, including pipeline facilities on the Outer Continental Shelf (OCS). Covered pipelines include, but are not limited to:
 - (1) Any pipeline that transports a highly volatile liquid;
 - (2) ...
- Per §195.2 Definitions,

Highly volatile liquid or HVL means a hazardous liquid which will form a vapor cloud when released to the atmosphere and which has a vapor pressure exceeding 276 kPa (40 psia) at 37.8 deg C (100 deg F).



Appendix C to Part 195-Guidance for Implementation of Integrity Management Program

| Safety risk indicator | PRODUCT TRANSPORTED | |
|-----------------------|---------------------------------|---|
| | Considerations ¹ | Product examples |
| High | (Highly volatile and flammable) | (Propane, butane, Natural Gas Liquid (NGL), ammonia). |
| | Highly toxic | (Benzene, high Hydrogen Sulfide content crude oils). |
| Medium | Flammable-flashpoint <100F | (Gasoline, JP4, low flashpoint crude oils). |
| Low | Non-flammable-flashpoint 100+F | (Diesel, fuel oil, kerosene, JP5, most crude oils). |









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What are Natural Gas Liquids (NGLs)?

| NGL Attribute Summary | | | |  |
|-----------------------|---|---|--|---|
| Natural Gas Liquid | Chemical Formula | Applications | End Use Products | Primary Sectors |
| Ethane | C_2H_6  | Ethylene for plastics production; petrochemical feedstock | Plastic bags; plastics; anti-freeze; detergent | Industrial |
| Propane | C_3H_8  | Residential and commercial heating; cooking fuel; petrochemical feedstock | Home heating; small stoves and barbeques; LPG | Industrial, Residential, Commercial |
| Butane | C_4H_{10}  | Petrochemical feedstock; blending with propane or gasoline | Synthetic rubber for tires; LPG; lighter fuel | Industrial, Transportation |
| Isobutane | C_4H_{10}  | Refinery feedstock; petrochemical feedstock | Alkylate for gasoline; aerosols; refrigerant | Industrial |
| Pentane | C_5H_{12}  | Natural gasoline; blowing agent for polystyrene foam | Gasoline; polystyrene; solvent | Transportation |
| Pentanes Plus* | Mix of C_5H_{12} and heavier | Blending with vehicle fuel; exported for bitumen production in oil sands | Gasoline; ethanol blends; oil sands production | Transportation |

C indicates carbon, H indicates hydrogen; Ethane contains two carbon atoms and six hydrogen atoms

*Pentanes plus is also known as "natural gasoline." Contains pentane and heavier hydrocarbons.

Source: U.S. Energy Information Administration



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NGLs – Potential Hazards

GUIDE 115

GASES - FLAMMABLE
(INCLUDING REFRIGERATED LIQUIDS)

ERG2012

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **EXTREMELY FLAMMABLE.**
- Will be easily ignited by heat, sparks or flames.
- Will form explosive mixtures with air.
- Vapors from liquefied gas are initially heavier than air and spread along ground.

CAUTION: Hydrogen (UN1049), Deuterium (UN1957), Hydrogen, refrigerated liquid (UN1966) and Methane (UN1971) are lighter than air and will rise. Hydrogen and Deuterium fires are difficult to detect since they burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.)

- Vapors may travel to source of ignition and flash back.
- Cylinders exposed to fire may vent and release flammable gas through pressure relief devices.
- Containers may explode when heated.

Source: US DOT, PHMSA, Emergency Response Guidebook



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Be Prepared

What you should know before an incident

- The names of companies operating pipelines in your community
- Emergency and non-emergency contact information for all operators
- The approximate location of the pipelines
- What materials or products are being transported in the pipelines
- The physical indications of an unintended release
- The possible hazards associated with an unintended release
- The maximum potential impact an unintended release may have
- The steps that should be taken to protect the public



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Responding to 911 Calls About a Strange Odor or Leak

- Approach the scene w/ caution
- Take precautions against fire hazard (avoid spark/ignition from vehicles, cell phones, two-way radios, lights, etc.)
- Look for clues that a pipeline is involved
- Find marker sign
 - Pipeline product
 - Pipeline operator
 - Operator's emergency Phone number
- Call pipeline operator to report potential incident
- Keep people out



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Awareness and Communication is Essential

- The most important aspects of pipeline emergency preparedness and response are communication and cooperation between pipeline operators and first responders
- There is no substitute for establishing positive working relationships ***before emergencies occur***
- Regulations require pipeline operators to have public awareness and emergency plans
- Important to work out the “what if’s”



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Important Resources



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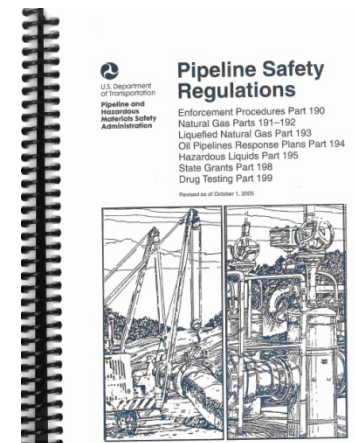
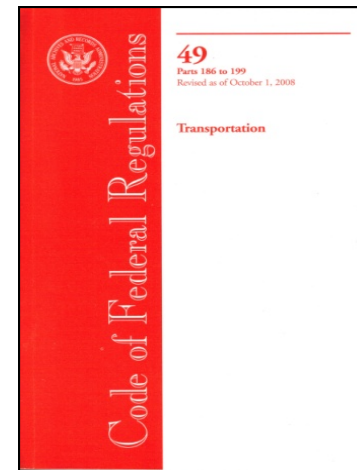
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Important Links

- PHMSA, Office of Pipeline Safety –
www.phmsa.dot.gov/pipeline
- Access to PHMSA Regulations (Easy to read/print 49 CFR Part 190-199) -
www.phmsa.dot.gov/pipeline
 - Click on “Training and Qualifications”
 - Click on “Regulatory Information”
 - Click on the Part you want
- For Federal Regulations (Official Version)–
www.regulations.gov



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National Pipeline Mapping System (NPMS)



www.npms.phmsa.dot.gov



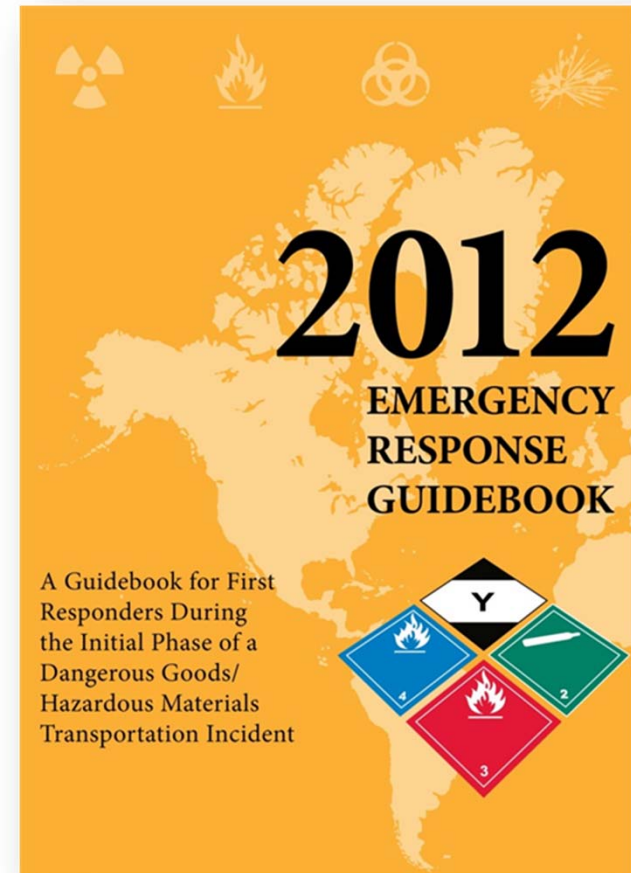
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Emergency Response Guidebook (ERG)

- Aids emergency responders
- Identifies specific or generic hazards of material(s)
- Provides for protective actions



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2012 ERG – Added Pipeline Transportation Information

PIPELINE TRANSPORTATION

Hazardous materials are transported in North America through millions of miles of underground pipelines. Products commonly transported through these pipeline systems include natural gas, crude oil, gasoline, diesel fuel, and jet fuel. Although the pipelines are buried, there are aboveground structures and signs indicating the presence of underground pipelines.

Liquid Pipelines

Surface indications of a liquid pipeline leak can include:

- Liquids bubbling from the ground
- "Oil slick" on flowing or standing water
- Flames that appear to be coming from the ground
- Vapor clouds

Structures – Storage Tanks, Valves, Pump Stations, Aerial Patrol Markers

Signs – Will often appear at road, railroad, and water crossings. Signs may also be posted at property boundaries. The signs will include the operator's name, product transported, and an emergency phone number for the operator. Warning, Caution, or Danger will appear on the signs.



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Gas Pipelines

Surface indications of a gas pipeline leak can include:

- Hissing, roaring, or blowing sound
- Dirt or water being blown in the air
- Continuous bubbling in wet or flooded areas
- Flames that appear to be coming from the ground
- Dead or brown vegetation in an otherwise green field
- In winter, melted snow over the pipeline

Gas Transmission pipelines are large-diameter, steel lines transporting flammable, toxic, or corrosive gas at very high pressure.

Structures – Compressor Station Buildings, Valves, Metering Stations, and Aerial Patrol Markers

Signs – Will often appear at road, railroad, and water crossings. Signs may also be posted at property boundaries. The signs will include the operator's name, product transported, and an emergency phone number for the operator. Warning, Caution, or Danger will appear on the signs.



Natural gas **Distribution** pipelines are typically smaller-diameter, lower-pressure pipelines and may be steel, plastic, or cast iron. Natural gas is delivered directly to customers through distribution pipelines.

Regulator stations, customer meters & regulators, and valve box covers are generally the only aboveground indications of gas distribution pipelines.

Should you notice a leak or a spill, remember to only approach from upwind and uphill, identify the emergency telephone number for the company and then call that number as well as 911. Be cautious concerning the risks of asphyxiation, flammability as well as the danger of a potential explosion.

If you know the material involved, identify the three-digit guide number by looking up the name in the alphabetical list (blue-bordered pages) and then by using the three-digit guide number, consult the recommendations outlined in the recommended guide.

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ERG – New Focus on Pipelines

- Pipelines 101 (types of pipelines, associated structures, and markers)
- Indications of pipeline leak/rupture
- Fundamentals of response
 - Don't extinguish fire, never operate valves
 - Evacuate upwind far enough from any noise to allow normal conversation, prevent people from entering area
 - Do not create ignition source (phones, lights, vehicle engines, etc.)
 - Abandon equipment used in/near the area
 - Call 911 from a safe location
 - Notify pipeline operator



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ERG (continued)

- Considerations for Establishing Protective Action Distance:
 - Pressure and diameter of pipe
 - Timing of valve closure by utility
 - Dissipation time of gas once valves are closed
 - Heat factor of material in pipe
 - Local variables: weather, topography, population density, demographics, available fire suppression
 - Nearby building construction material/density
 - Wild land/urban interface
 - Natural and manmade barriers (highways, etc.)
- If material involved is known, identify three-digit guide number by looking up name in alphabetical list in ERG (blue-bordered pages) and consult recommendations



Where to Find More Information...

The screenshot displays the PHMSA (Pipeline and Hazardous Materials Safety Administration) website. The header includes the PHMSA logo, the U.S. Department of Transportation logo, and navigation links for 'Contact Us', 'FAQs', and 'Site Map'. Below the header is a navigation bar with 'PHMSA Home', 'Pipeline Safety', and 'Hazardous Materials Safety'. A search bar with a 'Go' button and 'Advanced Search' link is also present. The main content area features a large banner for the '2012 EMERGENCY RESPONSE GUIDEBOOK' with the headline 'DOT Distributes Over 2 Million New Hazardous Materials Emergency Guidebooks to Nation's First Responders'. To the right, there are sections for 'Hazmat News', 'Most Viewed Info', and 'Safety Advisories'. The 'Safety Advisories' section lists several updates, including 'PHMSA Continues Push to Clarify & Update Hazmat Rules', '2011 Hazmat Penalty Action Report', 'Hazmat Harmonization Rule on Air Packaging Issued', 'PHMSA seeks comment on transportation of lithium batteries', and 'PHMSA Proposes Updating Hazmat Rules to Better Balance Safety Standards and Regulatory Requirements'. Below the banner, there is a 'Find PHMSA Offices' section with a map of the United States and a dropdown menu for 'Regional Offices'. To the right of the map is a 'PHMSA/Hazmat Resources' section with links to 'Regulations & Rulemakings', 'Data & Reports', and 'Permits & Approvals'.

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Contact Us | FAQs | Site Map

PHMSA Home | Pipeline Safety | Hazardous Materials Safety

Go Advanced Search

2012 EMERGENCY RESPONSE GUIDEBOOK
DOT Distributes Over 2 Million New Hazardous Materials Emergency Guidebooks to Nation's First Responders

Hazmat News | **Most Viewed Info**

Safety Advisories

- PHMSA Continues Push to Clarify & Update Hazmat Rules
- 2011 Hazmat Penalty Action Report
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- PHMSA seeks comment on transportation of lithium batteries
- PHMSA Proposes Updating Hazmat Rules to Better Balance Safety Standards and Regulatory Requirements

Find PHMSA Offices

Key Officials
Regional Offices

PHMSA/Hazmat Resources

- Regulations & Rulemakings**
PHMSA regulates and ensures the safe movement of hazardous materials.
- Data & Reports**
PHMSA tracks data on the frequency of failures, incidents and accidents.
- Permits & Approvals**

<http://hazmat.dot.gov>



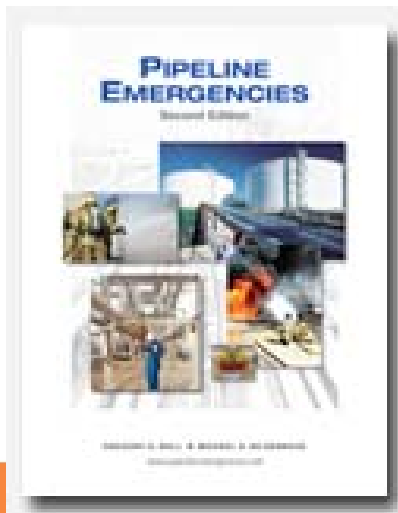
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Free Online First Responder Training - Pipeline Emergencies Training

- Comprehensive training program aimed at first responders and pipeline safety personnel developed by a team of hazardous materials specialists through a cooperative agreement between PHMSA and the National Association of State Fire Marshals
- Provides an overview of pipeline operations and how to safely and effectively respond to pipeline emergencies



www.pipelineemergencies.com



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Thank You!!

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