



# Pipeline 101

What you need to know about pipelines



# Why Do We Need Pipelines?

- **Safe, efficient and economical way to move energy resources**
- **Moves resources from production areas or ports of entry to consumers, airports, military bases and more**
  - 185,000 miles of liquid petroleum pipelines
  - 320,000 miles of gas transmission pipelines
  - 2 million miles of gas distribution pipelines
- **No matter your mode of travel, pipelines likely supplied the energy**



# What Do Pipelines Transport?

## Transportation Industry

- Gasoline
- Diesel
- Jet fuel
- Kerosene

## Heating Resources

- Home heating oil
- Natural gas
- Propane

## Refiners & Manufacturers

- Crude oil (for refiners)
- Raw natural gas liquids
- Propylene (for headlights, foam insulation, hoses and more)

## Agriculture Industry

- Anhydrous ammonia (for fertilizer)
- Diesel fuel
- Propane



# Types of Pipelines

## Liquid Petroleum Pipelines

- Crude Oil Pipelines
  - Moves oil from production areas to collection points or storage facilities (2-8 inches in diameter)
- Refined Products Pipelines
  - Avg. 8-12 inches in diameter
  - 95,000 miles of pipelines nationwide (transports gasoline, jet fuel, home heating oil, diesel fuel, etc.)
  - Delivers petroleum products to fuel terminals for distribution via tanker trucks
  - Supplies major industries, airports and electrical power generation plants
- Highly Volatile Liquid Pipelines
  - Transports ethane, butane and propane
- Carbon Dioxide Pipelines (CO<sub>2</sub>)
  - Transports CO<sub>2</sub> to storage sites

**Gathering pipelines:** Gather raw products from production wells and transport it to transmission pipelines.

**Transmission pipelines:** Transport products thousands of miles from processing facilities to distribution centers and storage facilities.

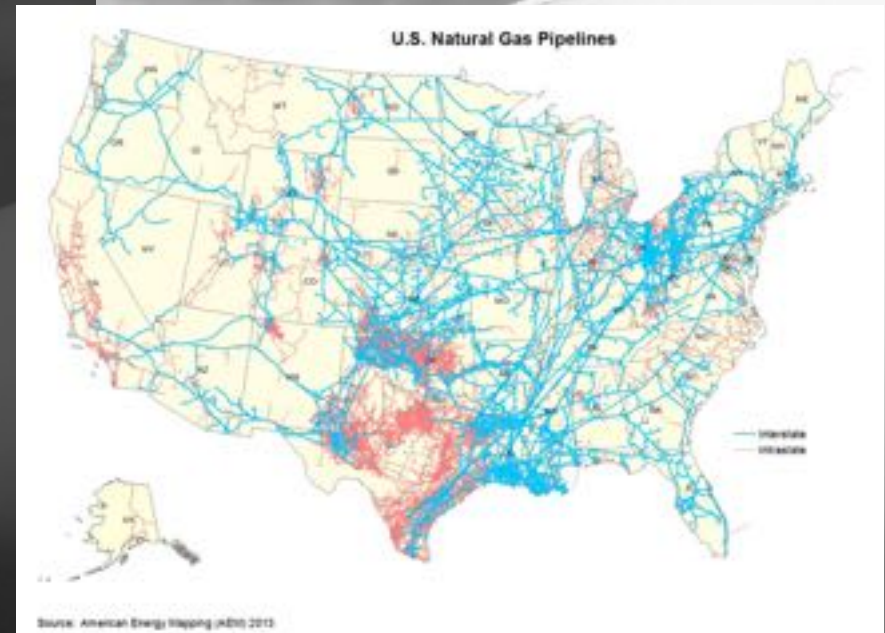
**Distribution pipelines:** distribute products to end users.



# Types of Pipelines

## Natural Gas Pipelines

- Supply more than 20 percent of all energy used in U.S.
- More than 71 million residential, commercial and industrial natural gas customers in U.S.
- Delivered directly to homes and businesses
- Natural gas liquids (NGLs) – divided into “dry” and “wet” natural gas products and transported in different pipelines





# The History of Pipelines

## 1800s

- 1879: Tidewater Pipeline, a 6-inch diameter, 110-mile wrought-iron pipeline connects production center in Coryville, PA to Williamsport, PA
- 1880-1905: Refineries built near oil fields and connected by pipelines to production sites

## 1900 – 1950

- 1920s: Pipeline mileage triples to 115,000 miles due to automobile boom
- 1945: Pipelines expanded further to support more product lines during WWII

## 1950 – present

- 1950s - 1960s: Pipeline industry installs infrastructure in U.S. Gulf Coast, Midwest and West Coast
- 1968: Colonial Pipeline established to supply products to eastern seaboard
- 1970-1977: Trans-Alaska Pipeline System (TAPS) completed
- 2000s: North American energy revolution leads to dramatic gains in crude oil and natural gas production



# Who Operates Pipelines?

- **Pipeline Operators**
  - Sole operators
  - Publicly traded Master Limited Partnerships
  - Stock corporations
  - Power and chemical plant companies
- **No ownership of products transported**
  - “Transportation service intermediaries”
  - Shippers reserve specific amount of space per month to transport products





# Transportation Process

- **Batching**

- Transport different types of liquid petroleum in same pipeline
- Fuel delivered may not be the exact fuel shipped, but meets same specifications

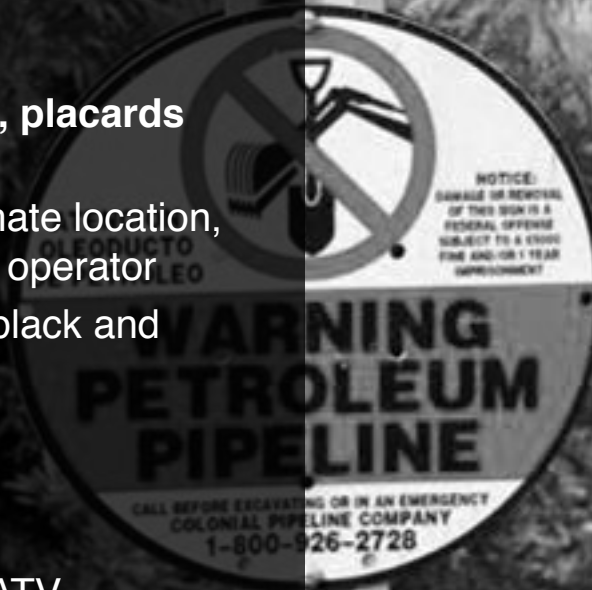
- **Cost & Oversight**

- Transportation cost equals about 2.5 cents per gallon of gasoline
- Federal Energy Regulatory Commission (FERC) regulates rates for interstate transport
  - Rates based on volume, distance between delivery points and competition in marketplace
- Natural gas pipelines regulated like traditional monopoly utility



# Where Are Pipelines Located?

- **Exist almost everywhere throughout U.S.**
  - 3 to 4 feet underground or deeper (rivers or roads)
- **Marked by aboveground signs, placards or stakes**
  - Indicate presence, approximate location, product carried and pipeline operator
  - Signs are generally yellow, black and red
- **Fenced and secured areas (for aboveground piping)**
  - Routinely patrolled by foot, ATV, airplanes and/or helicopters
- **Protected by National Call 811 Programs**





# Where Are Pipelines Located?



- **Private Land**
  - Written agreements, or easements, allow pipelines to traverse private property
- **Right-of-Way (ROW)**
  - Strip of land 25-150 feet wide containing the pipeline, which:
    - Enables workers to gain access for inspection, maintenance, testing or emergencies
    - Maintains unobstructed view for aerial surveillance
    - Identifies area that restricts certain activities



# Where Are Pipelines Located?

National Pipeline Mapping System - [www.npms.phmsa.dot.gov](http://www.npms.phmsa.dot.gov)





# Are Pipelines Safe?

- Barrel of crude oil or petroleum reaches destination safely 99.999% of time
- Better safety record than other modes of transportation for petroleum liquids
- Incidents – how do pipeline operators prepare?
  - Control room technologies
  - Emergency response plans and drills
  - Training with local first responders
  - Partner with National Transportation Safety Board (NTSB) and Pipeline Hazardous Materials Safety Administration (PHMSA) to determine incident causes and address potential problems





# Are Pipelines Safe?

- **Integrity Management**

- Evaluating, inspecting and maintaining pipelines to prevent releases
- Millions spent each year on research into new inspection technologies
- Billions spent each year on safety, etc.
  - “Smart pigs” – high-tech diagnostic device that travels inside pipeline to identify pipe irregularities; 90% detection rate
  - 24/7 control room operators reviewing information from instruments along pipeline
  - Shut-off valves to stop product flow within minutes and isolate pipelines where data indicates a possible leak



# How Can You Help With Safety?

- **“Call 811” (One Call Centers)**
  - 811 safeguards underground infrastructure including pipelines
  - Contact your local One Call Center before digging
- **Awareness**
  - Know where pipelines are located and lookout for irregularities
- **Leak Detection – use your senses**
  - Sight: Discolored vegetation, pools of liquid along right-of-way or suspicious vapor/mist
  - Smell: Unusual odor or scent
  - Sound: Hissing or roaring sound along right-of-way





# How Can You Help With Safety?



- **In the event of a leak:**
  - Leave leak area immediately and walk into the wind away from fumes
  - Do not touch, breathe or make contact with leaking liquids
  - Do not do anything to create a spark such as lighting a match, starting an engine or using a mobile phone
  - From a safe location, call 9-1-1 or your local emergency response number – and the pipeline company
  - Warn others if you can do so safely
  - Do not drive into a leak or vapor cloud area



# Resources

- [Call811.com](http://Call811.com)
- [NPMS.phmsa.dot.gov](http://NPMS.phmsa.dot.gov)
- [CommonGroundAlliance.com](http://CommonGroundAlliance.com)
- [AmericanPetroleumInstitute.com](http://AmericanPetroleumInstitute.com)
- [AOPL.org](http://AOPL.org) (Association of Oil Pipe Lines)

