



TEXAS PIPELINE  
ASSOCIATION

# PIPELINE FUNDAMENTALS



# Texas Oil & Gas: Generating \$2.6 Billion for State Revenues



# Texas Oil & Gas

- Texas produces 20% of US Domestic Oil Production
  - 1.1 Million Barrels per day; most in the nation
  - U.S. Consumption is ~19 Million Barrels per day
  - Import ~13.5 Million Barrels per day
- Texas produces 25% of US Domestic Gas Production
  - 16 Billion Cubic Feet per day
  - U.S. Gas Consumption ~64 Billion Cubic Feet per day
- Texas employees ~315,000 in oil and gas
  - In Houston roughly 5,000 companies are engaged in Oil and Gas

# Pipelines?

## Q&A:

- How does drinking water get to your tap?
  - Your local water utility (*pipeline*).
- How does rainwater drain from your street?
  - Your city's storm drain system (*pipelines*).
- Is your home heated by Natural Gas?
  - Your local gas company distribution (*pipeline*).
- If energy sources are offshore, how does it get onshore?
  - An offshore gathering (*pipeline*) system.
- With a limited number of refineries, how is gasoline distributed?
  - A petroleum products transmission (*pipeline*) system and terminal distribution.

# Why Pipelines?

## Question: how would you move these to market?

- Texas produced ~37 Million Barrels of Crude Oil in February 2012
  - Some was trucked to a refinery, some was railed, most was pipelined
  - About 90% of US domestic oil production is pipelined
- Texas produced ~425 Billion Cubic Feet of Natural Gas in February 2012
  - Essentially all was moved from the well head by pipeline

***As a matter of economics, safety, and environmental considerations, pipelines are the choice for the movement of petroleum and natural gas based products***



# Why Pipelines?

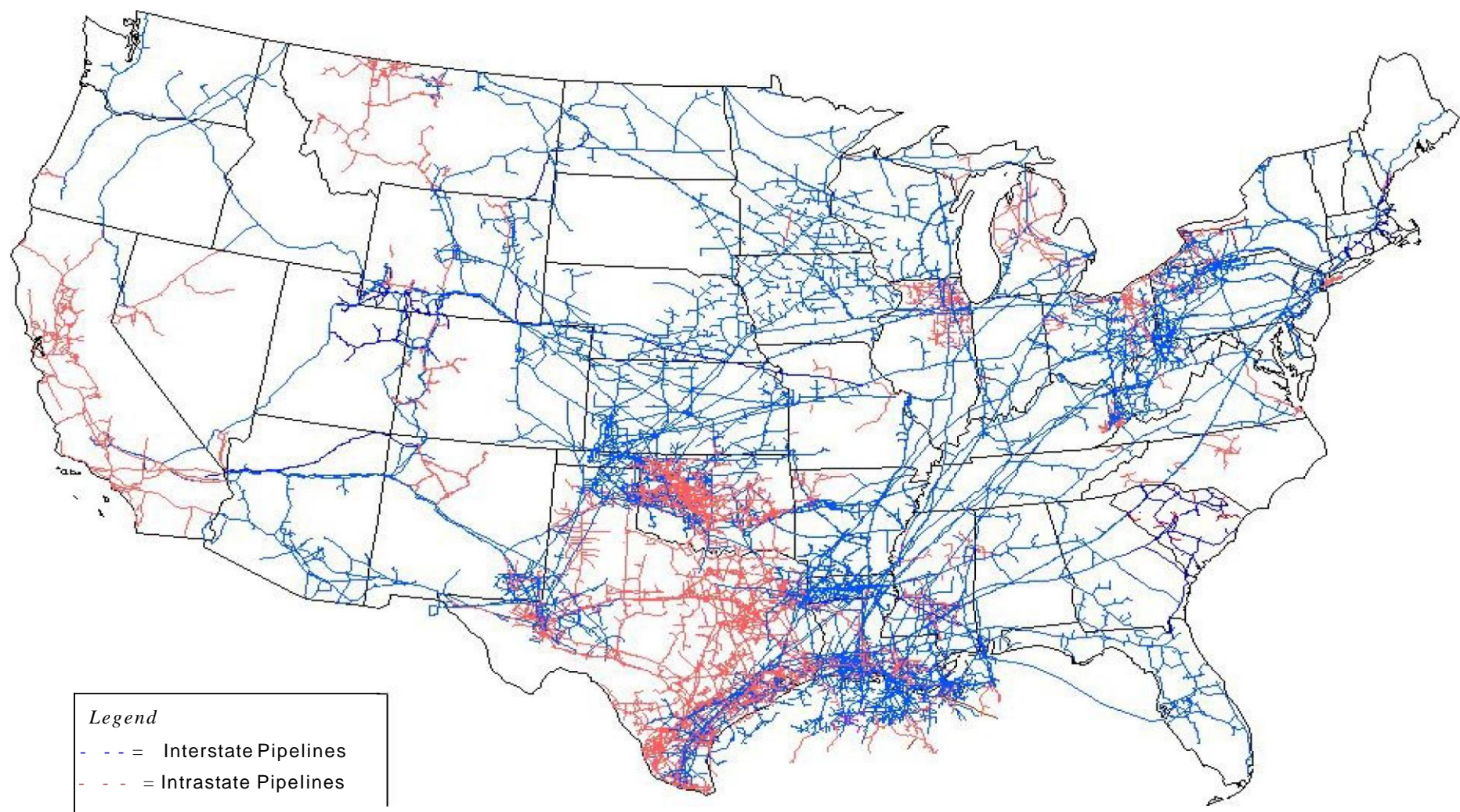
- Texas pipelines are an essential component of modern infrastructure that improves the quality of our lives and strength of our economy.
- Pipelines are the safest, most reliable, efficient and economic means of transporting large quantities of natural gas, crude and refined petroleum products.

# Why Pipelines?

## Crude Oil Example:

- If a pipeline moves 150,000 Barrels per day of crude –
  - Railroad train of 75 tank cars of 2,000 barrels each or 84,000 Gallons each
  - Truck equivalent: 750 trucks each with 200 Barrels
  - Texas February Production: 18,500 tank cars; 185,000 trucks
- From PHMSA, compared to pipelines:
  - 87 times more oil transport truck-related deaths
  - 35 times more oil transport truck related fires/explosions

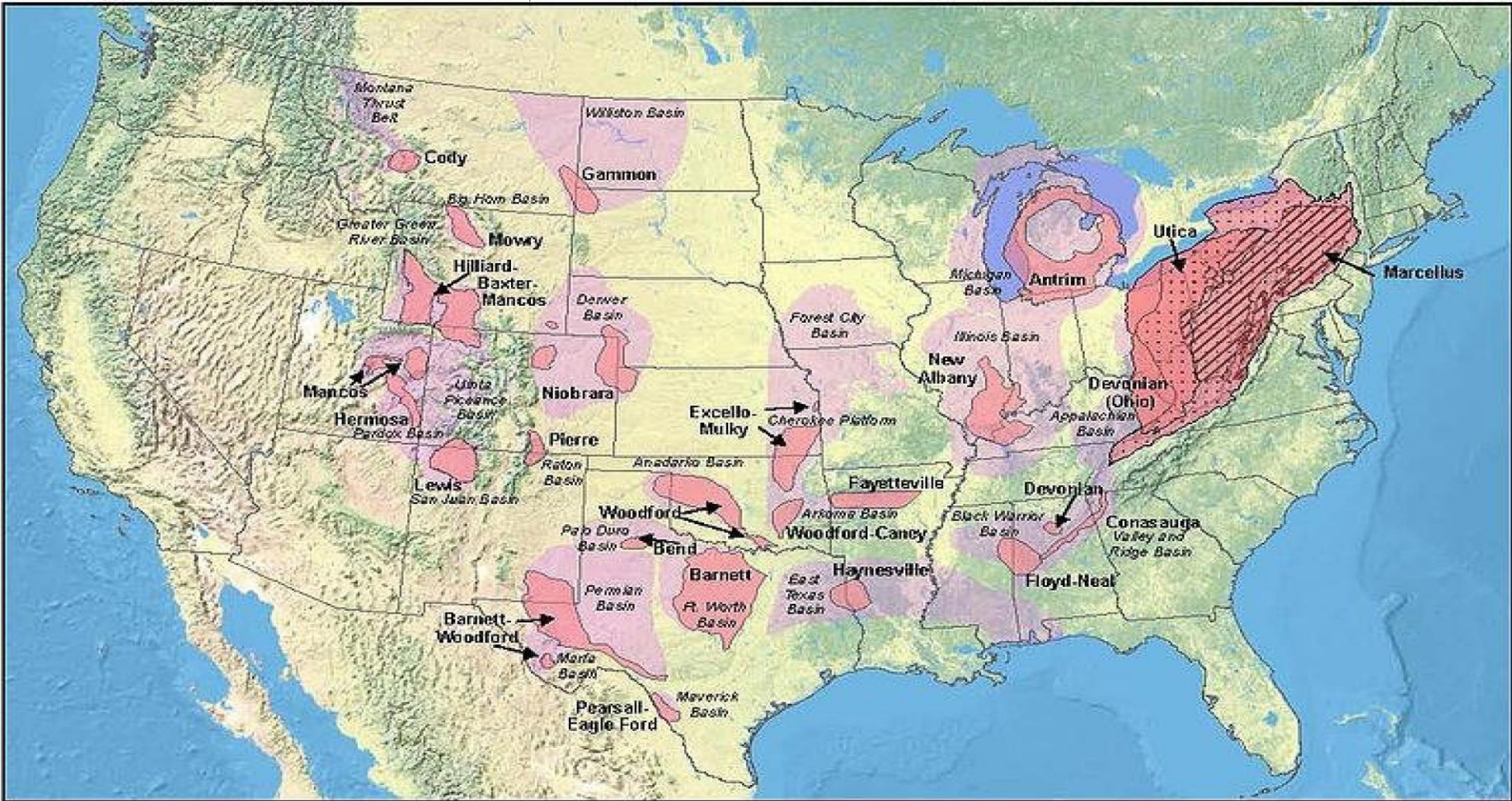
*The pipeline produces much less air pollutants, less spillage, and improves safety by reducing vehicles used in ground transport*



*Legend*  
- - - = Interstate Pipelines  
- - - = Intrastate Pipelines

Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System



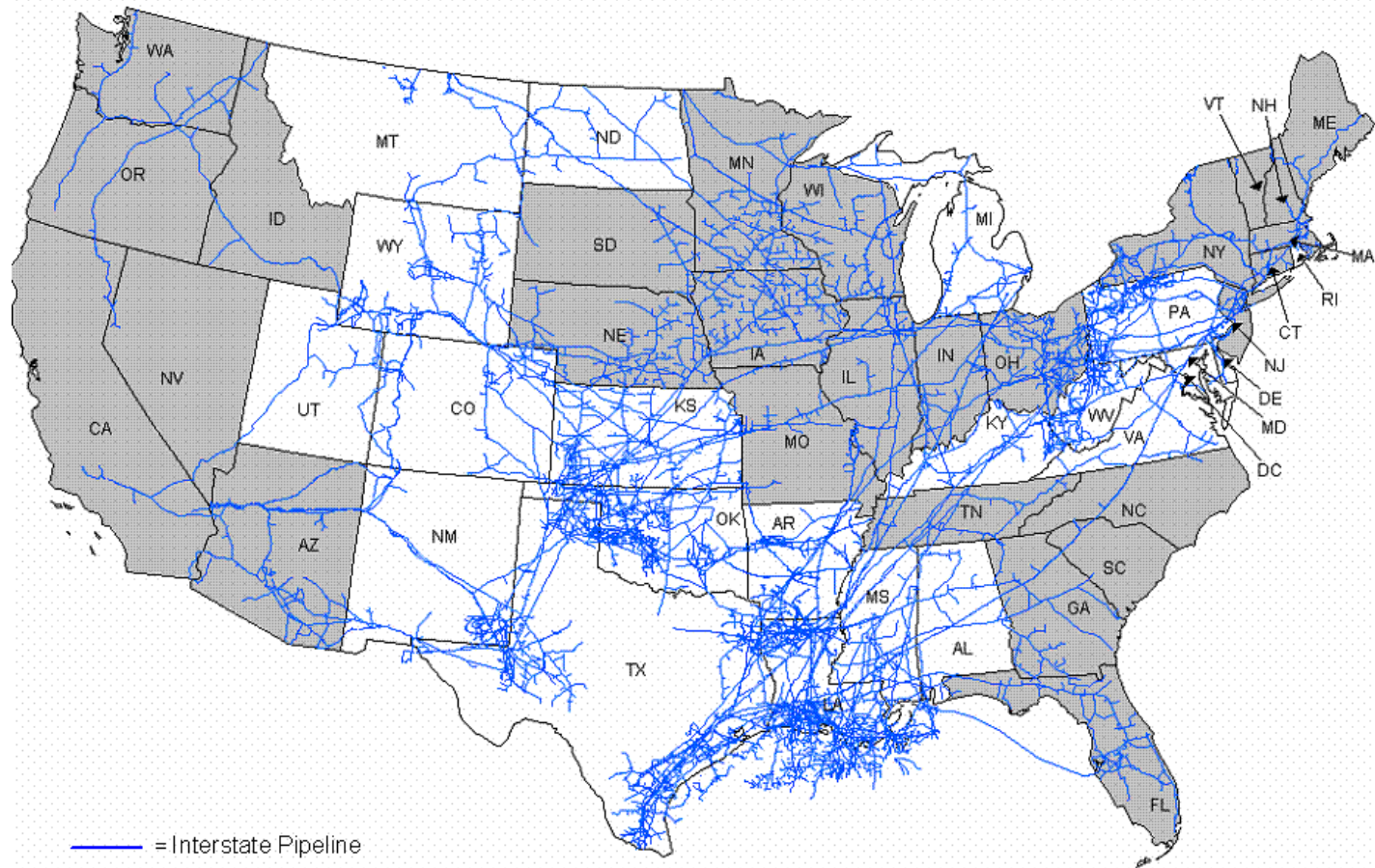


# United States Shale Gas Plays



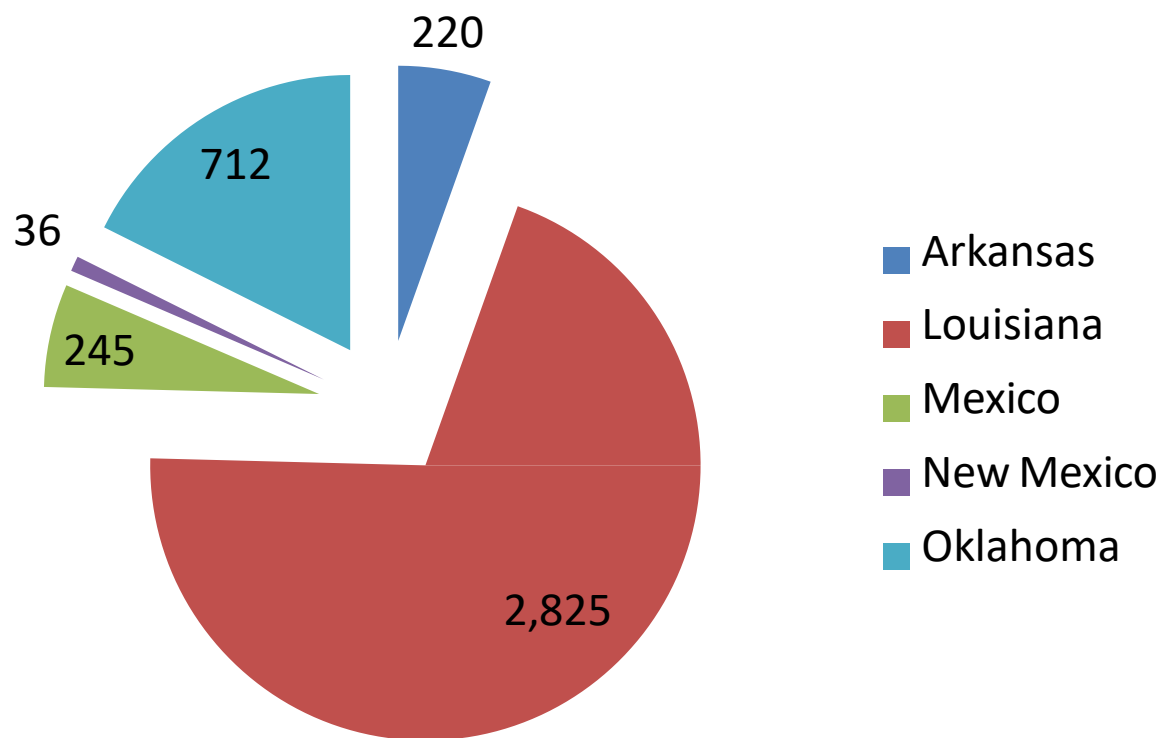


# States Dependent on Natural Gas Pipelines





# 2010 Texas Domestic Transfers BCF



Texas Transfers Approximately 70% of Annual Gas Production

# Typical O&G Products Moved In Pipelines

- Crude Oil:
  - Sweet, Sour, Heavy and Light
- Refined Products:
  - Motor Gasoline, Diesel, Heating Oil, Kerosene, Jet Fuel

Note: The same pipeline can move these products by “batching”
- Natural Gas:
  - In the transmission pipelines it is compressed, dry, odorless
- Natural Gas Liquids:
  - Ethane: Basic Petrochemical Building Block; plastics
  - Propane: Petrochemicals and Heating
  - Butane: Motor Gasoline Winter Blend, Heating
  - Pentanes or “Natural Gasoline”: Motor Gasoline Blending
  - Mixed NGL’s

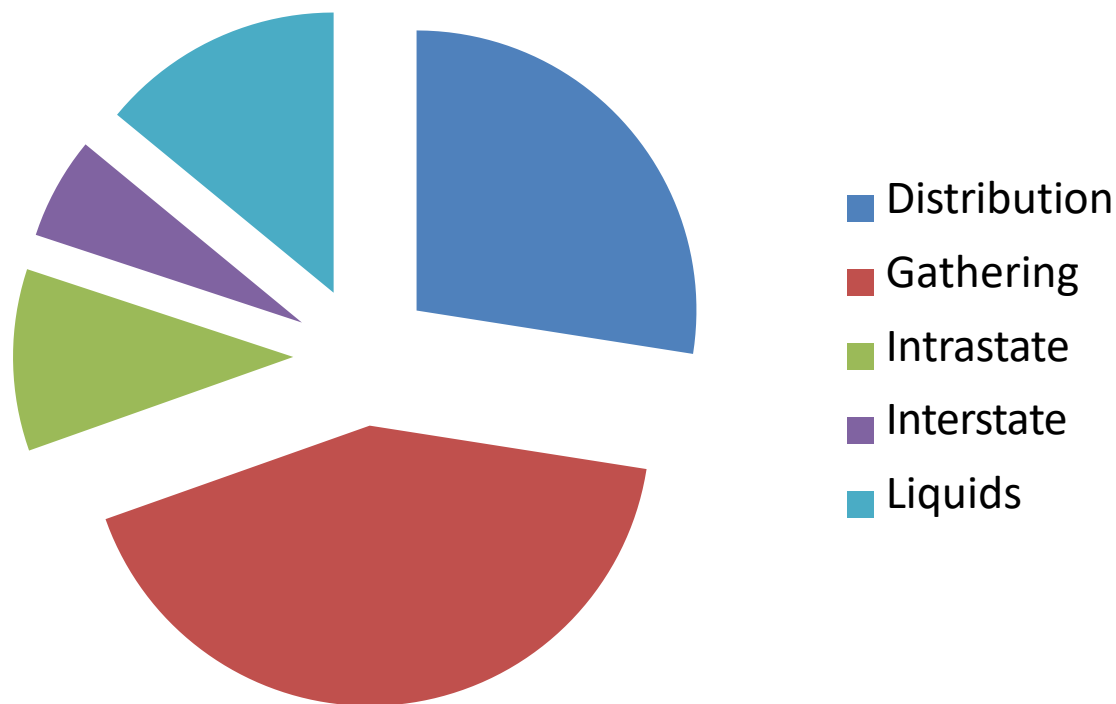


# What are the types of Natural Gas Pipelines?

- Flow or Production Pipelines – From the Wellhead
- Gathering Pipelines – Separation/Treating/Measuring
  - Separate production fluids
  - Initial separation of contained water – dehydration
  - Initial phase of volumetric measurement
  - Initial Condensate capture
  - Initial removal of “unwanted” content – e.g., Hydrogen Sulfide
  - Gas Processing to remove natural gas liquids
- Interstate and Intrastate Transmission Pipelines
  - Long haul pipelines
  - Interconnect with other pipelines
  - Direct delivery to industrial customers – e.g., power plants
- Distribution Pipelines
  - LDC (Local Distribution Co.) to residential customers

# Texas Pipelines - 374,318 Miles

**Texas Pipelines – 374, 318 Miles**





# Onshore Gathering Pipelines: Key Attributes

- Gathering Line Regulation:
  - Once the line is determined to be an onshore gathering pipeline:
    - In rural areas outside of towns, villages or areas designated as residential or commercial areas – not regulated
    - In non-rural areas – must meet same safety standards for design, construction, operation and maintenance as gas transmission lines
  - Gathering Line Definition:
    - A pipeline that transports gas from a current production facility to a transmission line or main

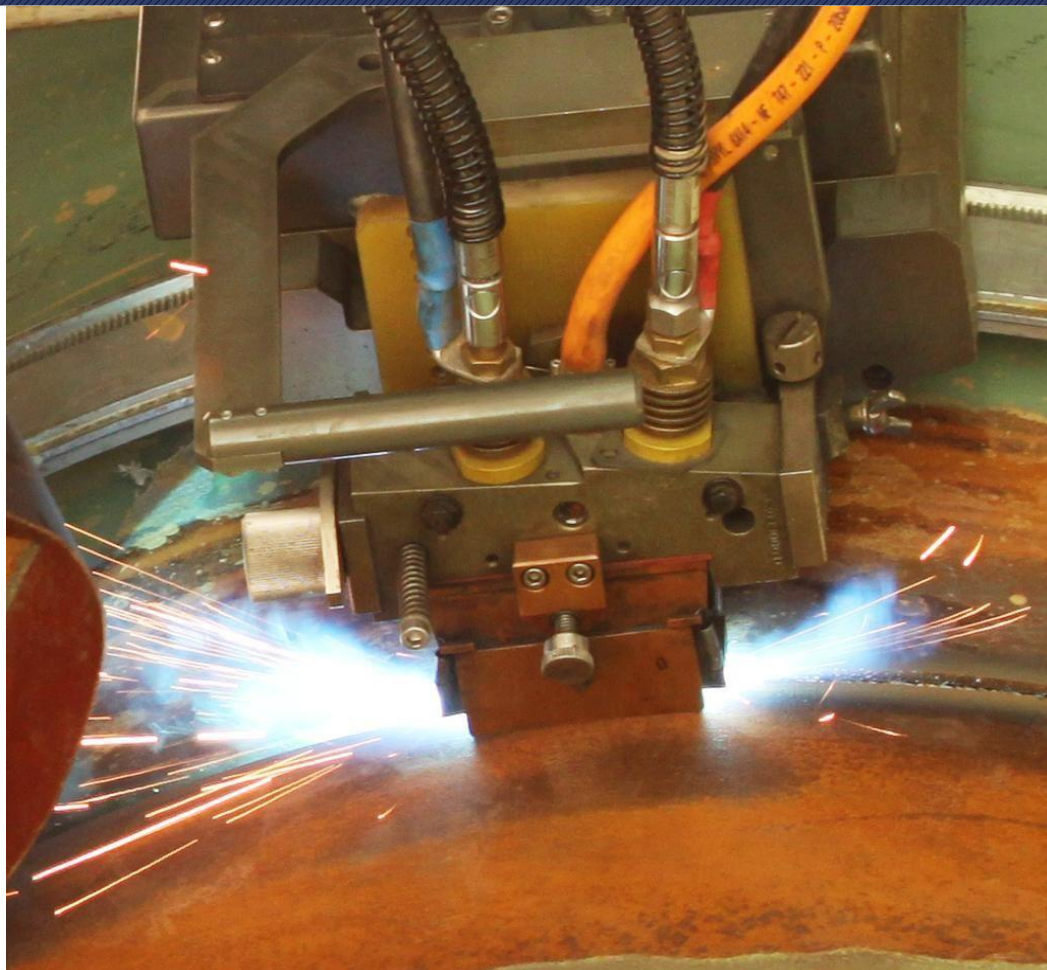
***There has been substantial difficulty in defining gathering pipelines; under the current DOT PHMSA 49CFR192 various installation parameters are described and the various gathering cases are captured***

# 42 Inch Pipeline Welding Stage

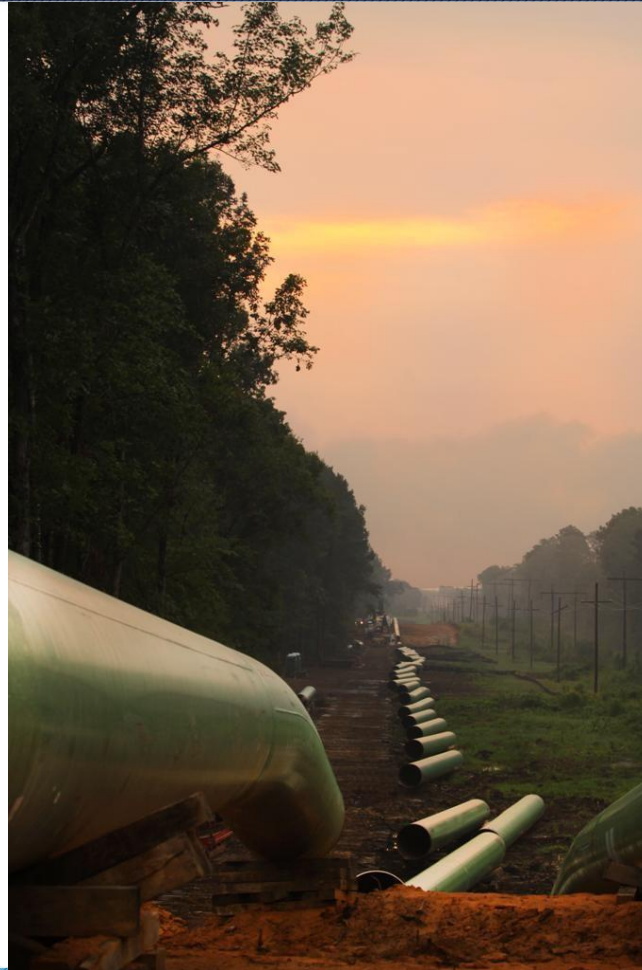




# Automated Welding 42 Inch Pipeline



# 42 Inch Pipeline Staging



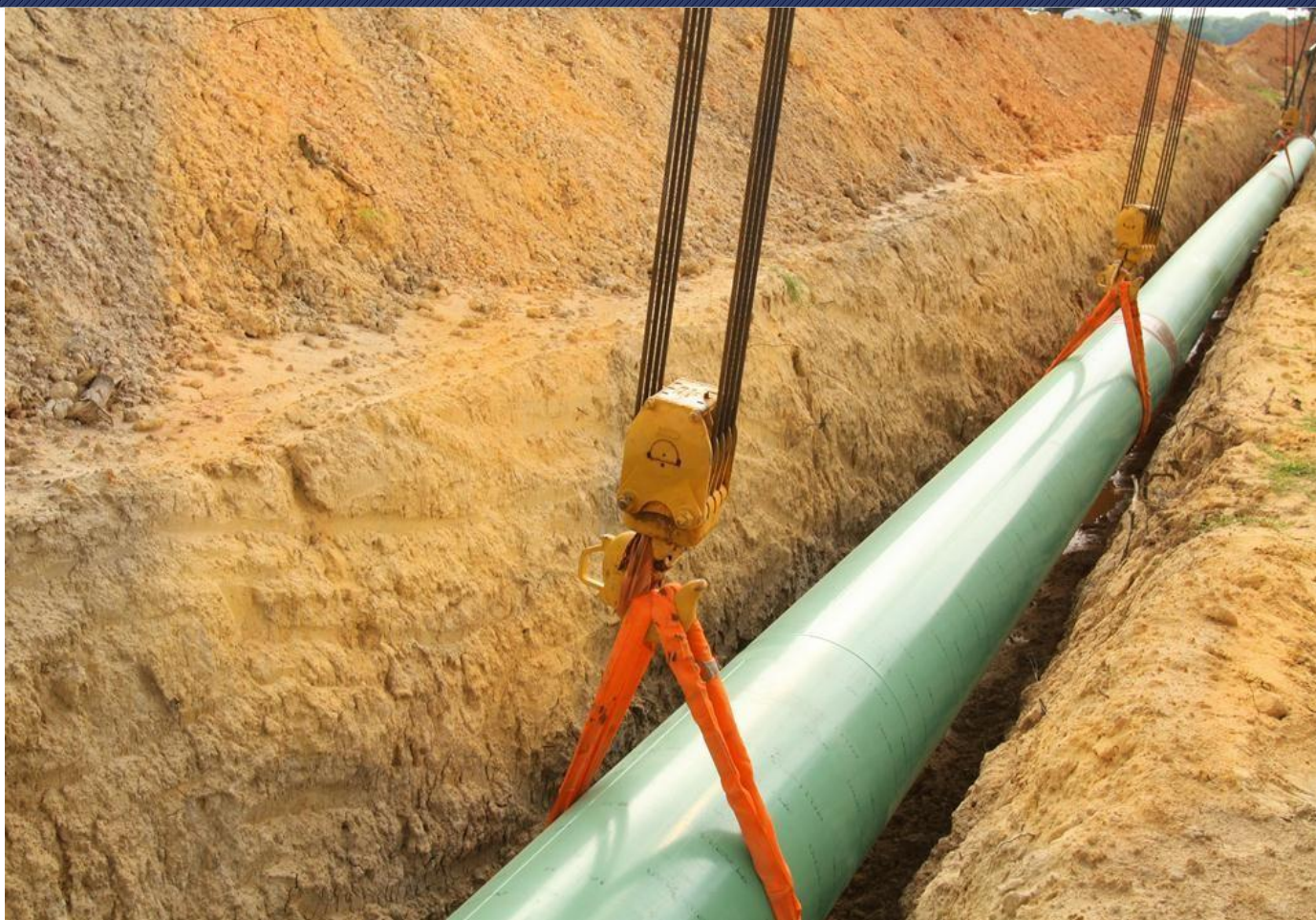


# Welded Section Ready for Placement





# Pipeline Lowering Technique





# Final Grading After Pipeline Installation





# Completed Right of Way: Eagle Ford Shale Development



# “Major” Natural Gas Pipeline Assets

- Dehydration
  - Water creates operational issues and displaces BTU heat content
  - Typical specification is seven pounds per million cubic feet of gas
- Treating
  - Carbon Dioxide (CO<sub>2</sub>) and Hydrogen Sulfide (H<sub>2</sub>S) are commonly removed
    - 2% CO<sub>2</sub>; 16 ppm H<sub>2</sub>S are common pipeline “sales gas” specifications
- Compression
  - Enables movement of volume
  - Safety controls establish maximum pressures (“MAOP”)
- Meter Stations
  - At the wellhead, at the central gathering point, at the gas plant, at delivery
- Gas Processing Plant
  - Extracts valuable components
  - Helps maintain a “fungible” national gas quality heat content
    - 1040 – 1060 BTU per Cubic Foot is a common “sales gas” heat content



# Dehydration Unit: Removes Water and Carbon Dioxide



# Natural Gas Compressor Station: Carthage, Texas





# Gas Processing: Extracts Natural Gas Liquids



# Natural Gas Meter Station





# Pipeline Safety

- The Texas pipeline industry uses advanced technology and techniques to safeguard the environment, minimize environmental impact, and protect the public and communities from injury or property damage.

# Natural Gas Pipeline Safety

- Integrity Management
  - Federal: Title 49 Part 192 Subpart O - Gas Transmission Pipeline Integrity Management
  - Texas: TAC Title 16 Part 1 Chapter 8 Subchapter B Rule 8.101
    - Background: Texas was the first state in the nation to mandate a pipeline integrity management program
    - Essence: Pipelines given specific timeline to test pipeline segments of “consequence”
    - December 17, 2012 Initial Assessments must be finalized
- Smart Inspection Tools
- Fly, Drive and/or Walk Over
  - Leak observation, land condition, unusual/unexpected conditions
- Pressure Testing
  - Initial Construction: Water Test At Multiple of Maximum Allowable Pressure (“MAOP”)
  - Pre-1970: Grandfathered Operation at Historical Records; PHMSA Advisory
- Excavator Concerns
  - Call Before You Dig “811”
- Odorization Requirements

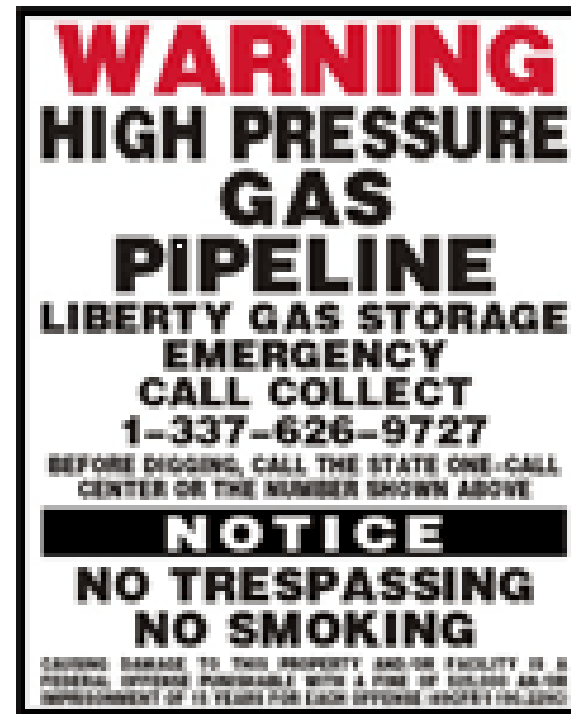
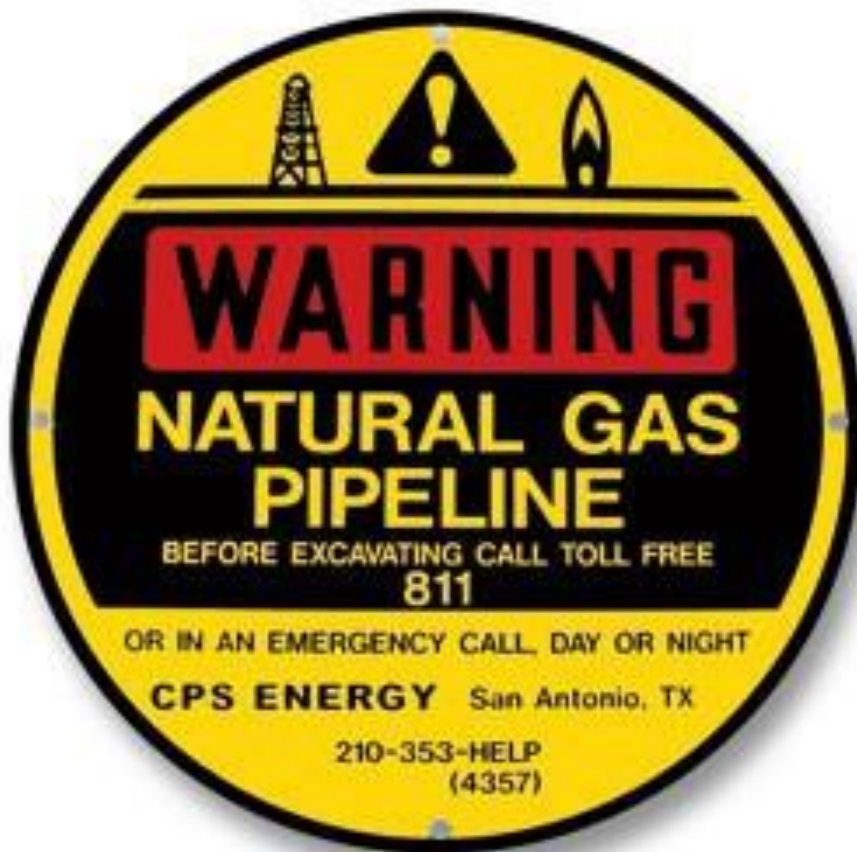


# Natural Gas Pipeline Safety – One Call Board of Texas



**Know what's below.  
Call before you dig.**

# Typical Pipeline Market: CPS Energy; Liberty Gas Storage







# Standard Type Pipeline Marker and Cleared Right of Way



# Cleaning “Pig”





# Gauging Tool



# Corrosion detection smart tool





# Pipeline Pig Launcher and Receiver



# Safety Regulation: Primary Regulators

	Natural Gas	Crude Oil	Liquids
<u>Interstate</u>			
Transmission	PHMSA	PHMSA	PHMSA
Offshore	PHMSA/BOEMRE	PHMSA/BOEMRE	PHMSA/BOEMRE



# Safety Regulation: Primary Regulators

	Natural Gas	Crude Oil	Liquids
<u><i>Texas Intrastate</i></u>			
Transmission	RRC	RRC	RRC
State Offshore	RRC	RRC	RRC
Gathering	RRC/PHMSA	RRC/PHMSA	-
Lease	RRC	RRC	-
Distribution	RRC/PHMSA	-	-

# Safety Regulation: Additional Jurisdiction

- FERC
- EPA
- TCEQ
- OSHA
- NTSB
- Homeland Security
- Corps of Engineers
- GLO
- Texas Historical Commission
- TxDOT
- Texas One Call Board



# Standard Safety Practices:

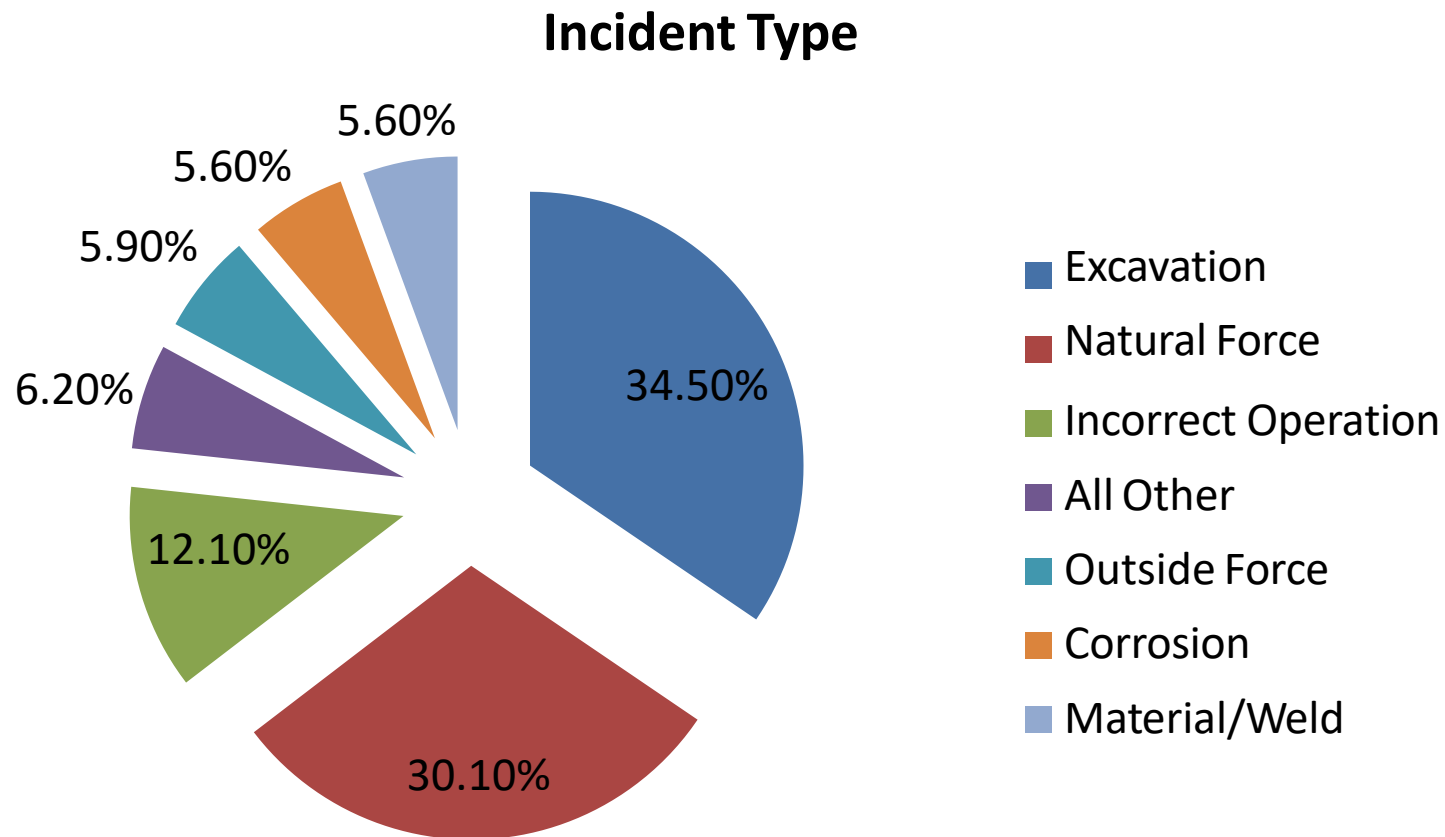
- Standards Associations: e.g., ASME and ANSI
  - ASME 31.8 – Natural Gas Pipeline Design
  - ASME 31.4 – Liquids Pipelines and Plant Piping Design
- Corporate Standards
  - Pipeline Coatings
  - Depth of Cover Standards
  - Construction Practices
  - Welding Standards and Welder Certification
  - Piping Inspection from Mill Run to Installation
- Cathodic Protection
  - Corrosion Protection

# Pipeline Control Room Practice

- SCADA - Supervisory Control and Data Acquisition
- Automated “Eyes” on the pipeline at key operational points
- Control Room Manned 24x7
- Field Office Response for Valve Operation
  - Automated Valves versus visual verification
  - Response Time Criteria
- Leak Detection Protocols
  - Pressure Monitoring
  - Volumetric Flow Criteria
- Local Response Coordination
  - First Responder Protocols
  - The pipeline industry regularly meet with and train first responders to test and refine emergency strategies
- PHMSA Control Room Management Rules



# PHMSA Incident History 1990 - 2009



# Concluding Remarks

- **Pipelines make it possible for the oil and gas industry, the economic backbone of Texas, to reliably transport essential consumer-driven products to market.**
- **The pipeline industry is committed to protecting the health and safety of workers and the communities in which they operate.**
  - Integrity Testing:
    - Energy Transfer Example:
      - Year 2011: \$33.4 Million – 395 Miles Tested
      - Initial assessment will be finalized prior to December 17, 2012  
Deadline
  - Industry Position:
    - Compliance with regulations is a priority
    - We live where we work and want a healthy environment
    - Safety is a first and foremost practice
    - We are proud of our record in manufacturing and transporting the nation's key energy creating fuels and products





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# Thank You!

[www.texaspipelines.com](http://www.texaspipelines.com)