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

stacked Appalachian Plays

November 2008
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
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 (CO2) and Hydrogen Sulfide (H2S) are commonly removed
    - 2% CO2; 16 ppm H2S 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 maintains 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

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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

Incident Type

- Excavation: 34.50%
- Natural Force: 30.10%
- Incorrect Operation: 12.10%
- All Other: 6.20%
- Outside Force: 5.60%
- Corrosion: 5.60%
- Material/Weld: 5.90%
- Other: 6.20%
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
Thank You!

www.texaspipelines.com