U. S. Pipelines;
Past, Present, & Prognostications

By

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GeoGathering 2008

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June 2, 2008

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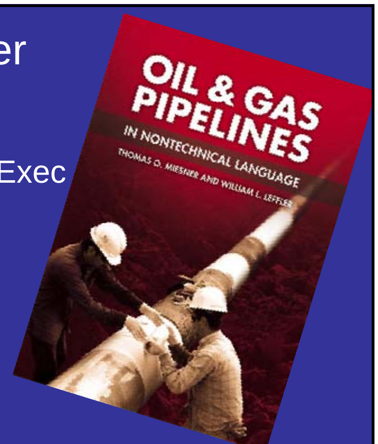


- 26 years with Conoco
  - Pipeline Eng, Ops, JV, BD, & Exec
  - Downstream strategy and BD
- Industry groups and boards
- President Conoco Pipeline
- Chairman AOPL
- Principal Miesner, LLC
  - Pipeline Education and Training
  - Strategy and Project Development
  - Expert Testimony, Litigations and Arbitration Consulting
  - Appraisals and Independent Opinions
  - Process Improvement

Outline

- Past
  - Pipeline accidents
  - Ownership changes
  - Technology advances
  - Regulations
  - Changing supply sources
  - National events
- Present
  - Asset integrity implementation
  - The drive for return
  - Construction boom
  - Changing demographics
- Prognostications

Global Pipeline Industry Dimensions

- 1,995,000 km (1,245,000 miles) gas and liquids*
  - 1,300,000 km (812,500 miles) gas
  - 388,500 km (242,800) miles) crude and condensate
  - 264,900 km (165,600 miles) refined products
- About 2/3 of total miles in U. S.
- US revenue
  - Natural gas $16.4 billion
  - Hazardous liquids $8 billion

***Source: CIA Fact Book, Extracted April 11, 2007 from https://www.cia.gov/cia/publications/factbook/fields/2117.html**

Pipeline Company Revenues & Income

PIPELINE COMPANY REVENUES, INCOMES — Table 3

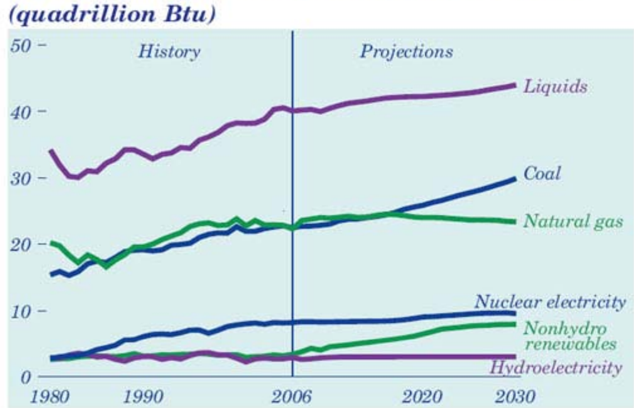
	Gas		Oil	
	Operating revenues, $1,000	Net income, $1,000	Operating revenues, $1,000	Net income, $1,000
1997	16,142,675	2,264,577	7,214,705	2,254,587
1998	13,584,783	3,010,821	6,890,083	2,050,982
1999	14,616,949	2,545,043	7,219,500	2,928,460
2000	14,980,925	2,910,835	7,483,100	2,705,463
2001	14,407,467	2,246,109	7,729,972	3,006,898
2002	14,015,308	2,734,182	7,811,951	3,408,753
2003	15,082,011	3,260,797	7,703,998	3,469,996
2004	15,781,445	3,588,344	8,019,554	3,322,738
2005	16,375,921	3,863,331	7,917,176	3,076,476
2006	$17,122,586	$4,015,253	$8,516,563	$3,743,115

Source: US FERC annual reports (Forms 2, 2A, and 6) by regulated interstate natural gas and oil pipeline companies

Source: Oil and Gas Journal

Annual Energy Demand by Fuel

Figure 3. Energy consumption by fuel, 1980-2030 (quadrillion Btu)



Source: Annual Energy Outlook 2008 with Projections to 2030 (Early Release)

Past Events That Shaped the Present

High Profile Pipeline Accidents

- 1992 Seminole Brenham, TX explosion
- 1994 San Jacinto River, Houston, TX release
- 1996 Koch Lively, TX explosion
- 1996 Colonial Reedy River release
- 1998 Northern States Power St Cloud, MN explosion
- 1999 Olympic Bellingham, WA release
- 2000 El Paso Carlsbad, NM explosion
- 2004 National Fuel Dubois, PA explosion
- 2005 PSE&G Bergenfield, New Jersey explosion
- 2006 BP North Slope, AK release

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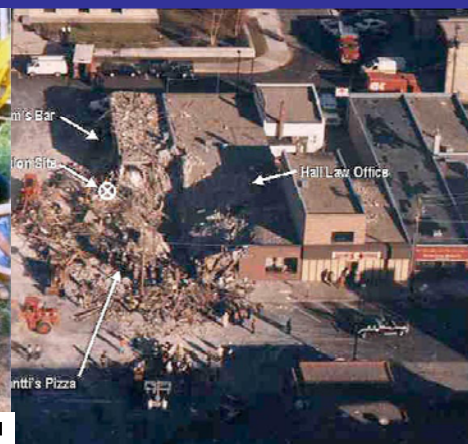
Reddy River and St. Cloud



Source National Transportation Safety Board

Olympic

Source National Transportation Safety Board

El Paso

Source National Transportation Safety Board

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BP Release Arial View

Photo Credit: Unified Command Photo

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BP Release Close Up


Photo Credit: BPXA


Photo Credit: BPXA

The Move to MLP Ownership

- 1986 – Buckeye Pipeline
- 1990 – TEPPCO Partners LP
- 1992 – Enron Liquids Pipeline, LP
- 1997 – Kinder and Morgan buy the GP of Enron Liquids Pipeline
- 1998 – Enterprise Products Partners LP
- Integrated majors and independents sell assets to MLPs or form their own MLPs

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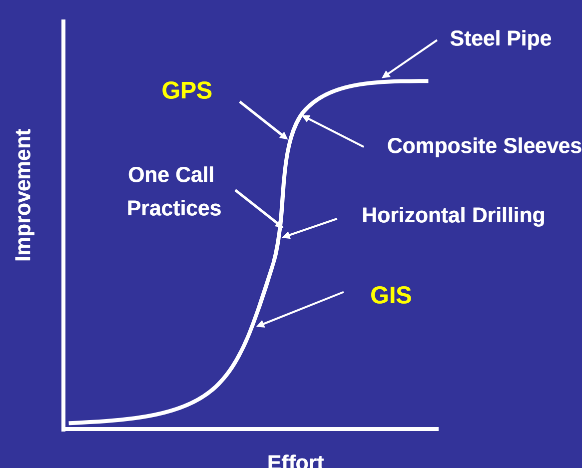
Technology Advances

- Steel
- Welding
- Equipment automation
- Scada
- Leak detection
- Internal Line Inspection
- Hydraulic calculations and power optimization
- GPS
- GIS

Improvement S-Curve – Pipeline Examples



Adapted from The Role of Energy Pipelines and Research in the United States by Cheryl Trench, Allegro Energy Consulting, and Thomas O. Miesner, Miesner, LLC. Published by The Steering Committee On Energy Pipelines and Research, May 2006, p. 47.

Key Laws and Regulations

- Natural Gas Safety Act and Hazardous Liquid Pipeline Safety Act
  - Pipeline Safety Improvement Act of 2002
  - Pipeline Inspection, Protection, Enforcement, and Safety Act of 2006
- Clean Water Act of 1972
- Tax Reform act of 1986
- FERC Orders 436 (1985) and 636 (1992)
- Title XVIII of the Energy Policy Act of 1992

Implications of Safety Rules

- Operator Qualification
- High consequence area inspections
- Integrity management plans
- Damage prevention
- Public communications (API 1162)
- Gas gathering integrity management
- Low stress integrity management
- Distribution integrity management

Changing Supply Sources

- Canadian oil sands crude oil
- Rocky Mountain gas
- Increased drilling fueled by energy prices
- Offshore LNG
- Gulf of Mexico crude oil and gas
- Russian crude to Asia Pacific
- Russian gas to Europe
- Asia Pacific infrastructure

Crude Oil from Canadian Oil Sands

Crude Oil Transportation Alternatives

Retrieved August 7, 2007 from the ConocoPhillips web site

Rockies Gas & LNG from Coasts

National Events

- 9/11
- Hurricanes Rita and Katrina
- Rising prices
- BP woes
- Excavation damage
- Aging work force
- Tight oil prices of the 80s and 90s

Current Challenges

Regulatory Driven Challenges

- Operator qualification for covered tasks
- Periodic inspections of lines in HCAs
  - Internal line inspection
  - Hydrotesting
  - Direct assessment
  - Other technologies
- Integrity repairs
- Rising costs for materials and labor
- Gas gathering and low stress rules
- Distribution integrity is just around the corner

Return Requirements

- GP receives increasingly larger percentages. For example…
  - 2% 0 – 60 cents
  - 15% 61 – 72 cents
  - 25% 73 – 93 cents
  - 50% 94+ cents
- Rising interest rates could drive down prices
  - Units yield 2 to 2.5% above 10 year T bill
  - As interest rates rise prices must fall to maintain yield

Construction Boom

- North America
  - Enbridge
  - Transcanada
  - Rocky Mountain Express (REX)
  - Colonial expansion
  - Alaska gas
- International
  - South and Central America 8,957 miles
  - Western Europe and European Union countries 1,160 miles
  - Middle East 3,941 miles
  - Africa 10,848 miles;
  - FSU and Eastern Europe 15,161 miles;
  - Asia Pacific 13,212 miles

P&GJ's Worldwide Pipeline Construction Preview

Other Issues

- Hot job market
  - Movement of personnel
  - New graduation hiring
  - Transfer from other industries
- Engineering and consulting
  - Consolidation
  - Integration along the value chain
  - Independent consultants
- Independent operators

Themes for the Future

- Safety
  - Public
  - Employee
- Environmental Performance
  - Water
  - Air
- Reliability
  - Availability
  - Quality
- Efficiency
  - Costs
  - Returns

Prognostications

- Public communication and education will become critical
- Canadian crude imports will continue
- Refined product movements will be flat
- Gathering, especially gas will continue to grow
- LNG import facilities will be over built
- Managing processes will come of age
- Knowledge will be critical for success
- A new generation of pipeliners will emerge

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Communication will be Critical

- Public communication and education will increase
  - Evaluating communication effectiveness (API 1162)
  - Understanding community sentiment
  - Gaining local official support
  - Understanding fosters acceptance
- A pipeline is a pipeline
  - Gas
  - Oil
  - Ownership
- The industry must work together to tell the story

Knowledge is Power

- Knowledge will be critical for success
  - Gathering data
    - Tools
    - Repositories
    - Maintenance
  - Turning data into knowledge
    - Tools
    - Understanding
- Managing processes will come of age
  - Process safety management as a model
  - Operations excellence systems already in existence

Changing Supply and Demand

- Canadian crude imports will continue
  - Large deposits exist
  - Huge investments are being made
- Refined product movements will be flat
  - Price will stimulate conservation
  - Bio fuels will create niche opportunities
- Gathering, especially gas will continue to grow
  - Increased drilling
  - Gas “requires” gathering by pipeline
- LNG import facilities will be over built

Operators of the Future

- Sound overall understanding of the industry
- Solid technical understanding
- Comfortable with technology tools
- Excellent project management skills
- High sensitivity to stakeholder needs
- Outstanding ability to understand data
- Effective communication skills

Suppliers of the Future

- Sound overall understanding of the industry
- Excellent technical skills
- Comfortable with technology tools
- Effective project management skills
- Sensitivity to stakeholder needs
- Effective data management skills
- Appreciation for the value of communication

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Conclusion

- Strategies to coexist with other infrastructure and populations must be developed and implemented
- Safety, environmental performance, reliability and efficiency have to be balanced
- Tools to gather and manage information must be developed, understood, maintained and used.
- Pipelines will continue to be critical to fostering our standard of living for the foreseeable future
- It is a great time to be in the pipeline business

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