Pipeline Safety and Efficiency

MARC Conference
June 2009

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In business to deliver

Pipeline Safety & Efficiency

Our aging infrastructure not only poses significant safety hazards, but can impact public health. What strategies and best practices can be used to improve our infrastructure?

or

Inadequately maintained infrastructure not only poses significant safety hazards, but can impact public health. What strategies and best practices can be used to improve our infrastructure?

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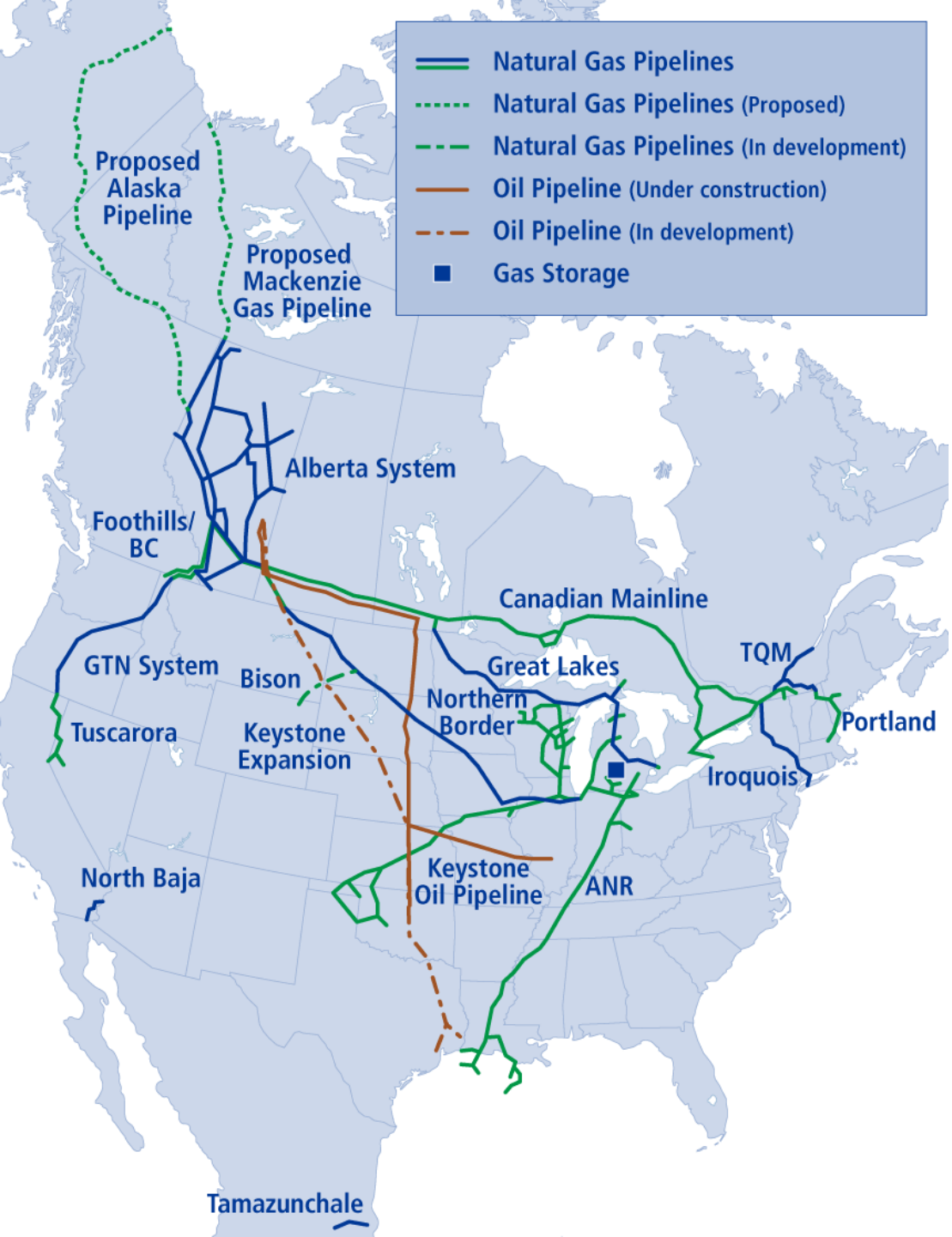

Pipeline Assets

- 36,500 mi of wholly owned natural gas pipeline
- Interests in an additional 4,800 mi of natural gas pipeline
- 250 Bcf of regulated natural gas storage capacity
- Average daily volume of approximately 15 Bcf
- 687 natural gas compressors
- Keystone oil pipeline 4,700 mi, 1.1 million Bbl/d

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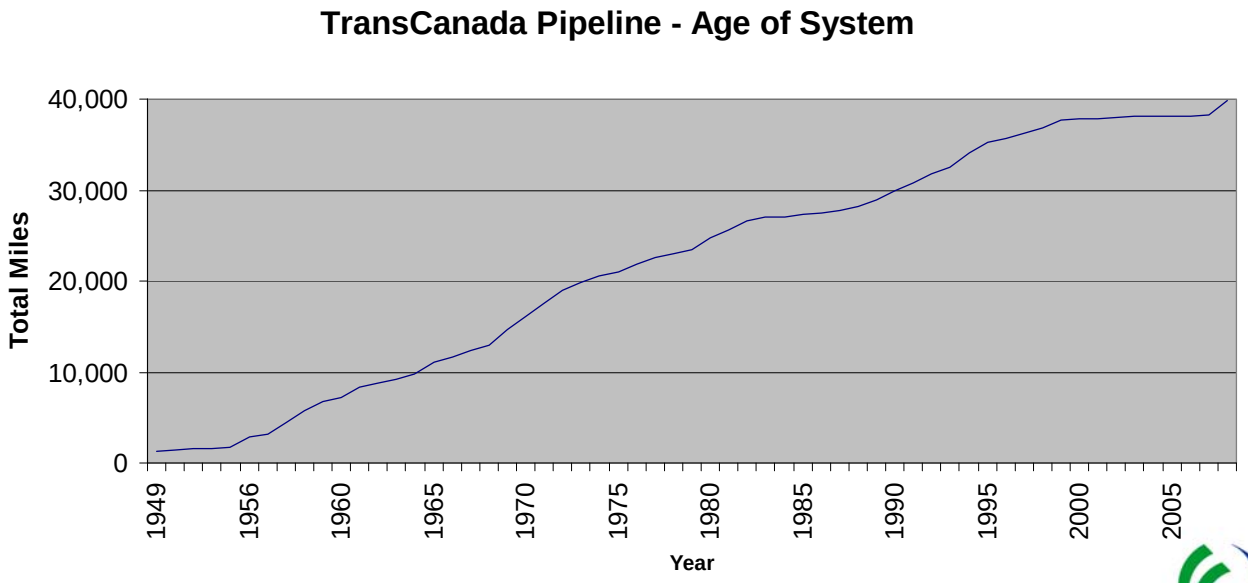
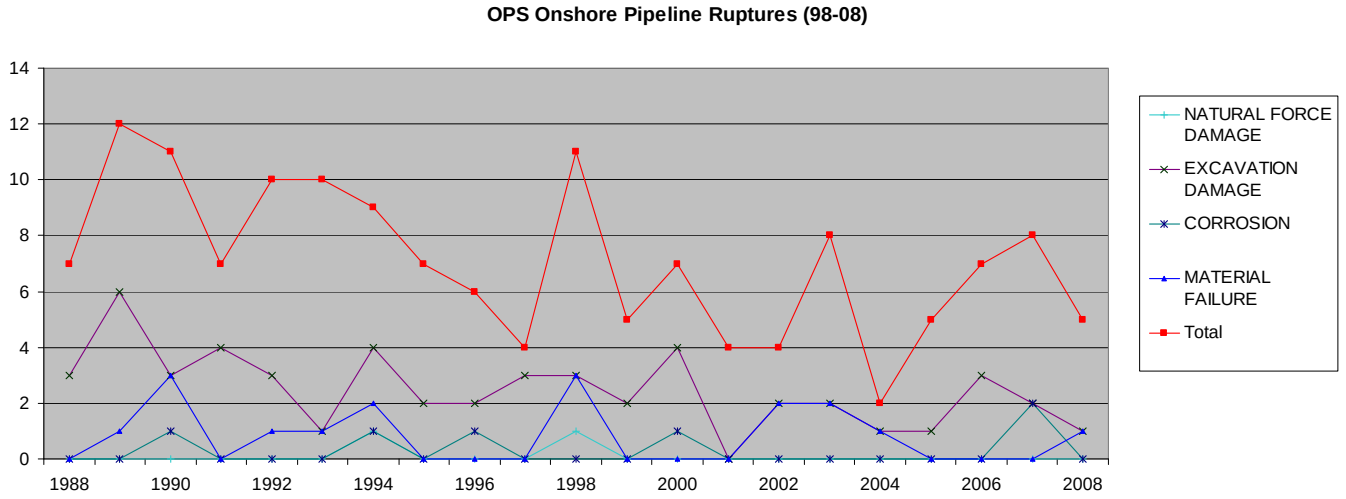
TransCanada Pipeline System

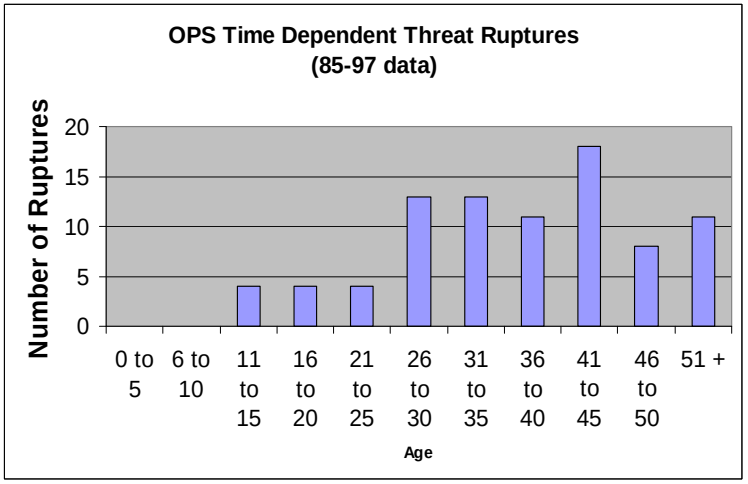
Pre	% of System	Accum. Mileage
1950	3%	1200
1960	17%	6800
1970	37%	14700
1980	59%	24000
1990	72%	29000
2000	95%	37800
2010	100%	40000

Diameter	%
x <= NPS 10	15%
NPS 10 < x < = NPS 20	17%
NPS 20 < x < = NPS 30	27%
x > NPS 30	41%
Total	100%



US Serious Incident Details – Onshore Gas Transmission





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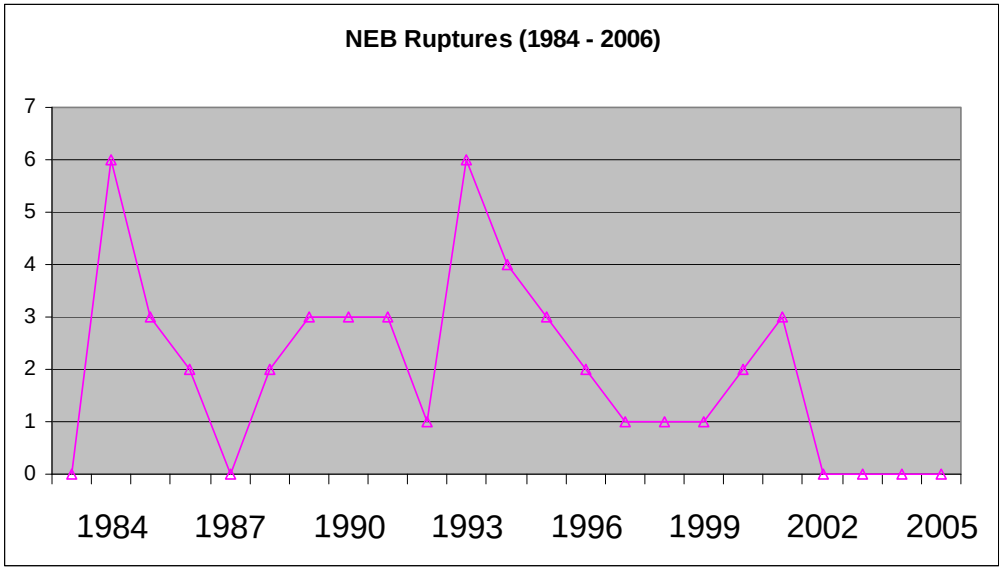
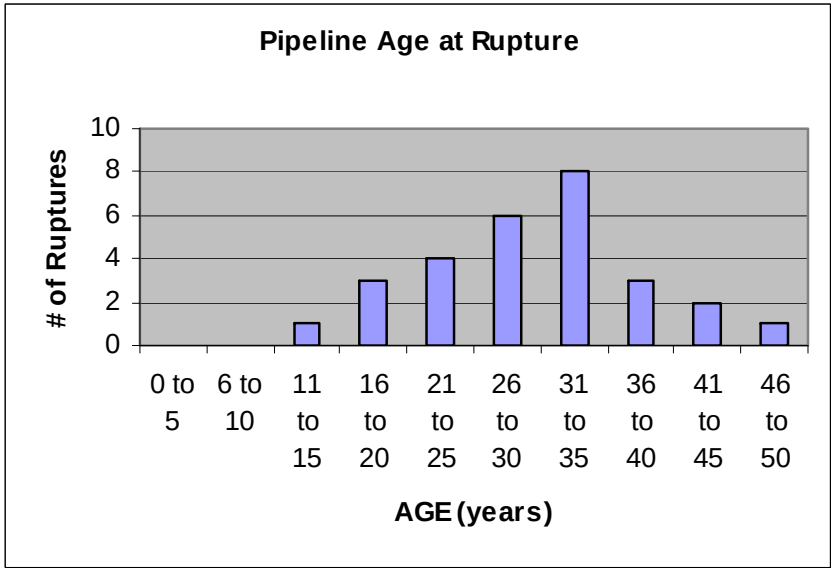
NEB Focus on Safety





Cause	Average Time to Rupture	Shortest Time to Rupture	Total Ruptures
SCC	21	13	10
External Corrosion	30	22	13

Cause	Tape		Asphalt	
	Number	Average Time to Rupture	Number	Average Time to Rupture
SCC	7	19	3	27
External Corrosion	9	29	4	31

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Pipeline Integrity Threats

Nine potential threat categories (as per ASME B31.8S):

Time Dependent Threats	Stable Threats	Time Independent Threats
External Corrosion	Manufacturing Defects	3rd Party Mechanical Damage
Internal Corrosion	Construction Defects	Incorrect Operations
Stress Corrosion Cracking	Equipment Failures	Outside Force

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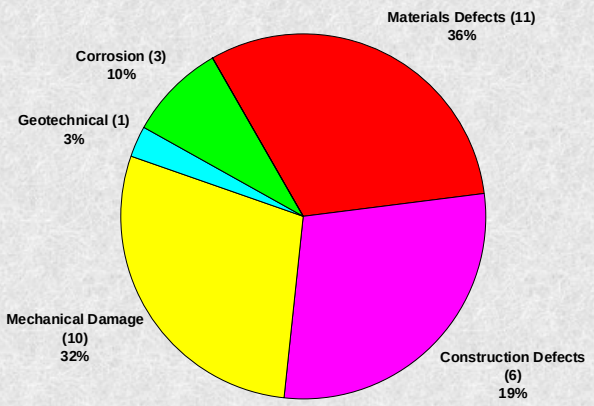
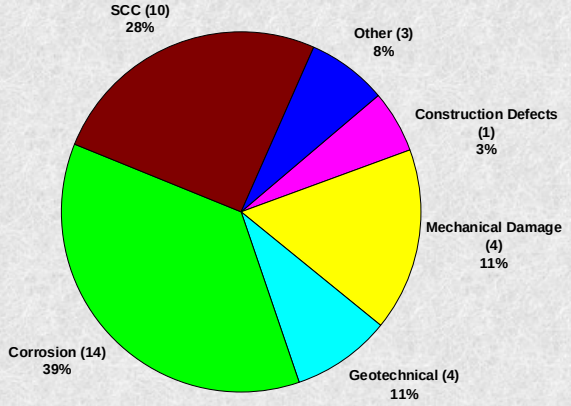
TransCanada Rupture History

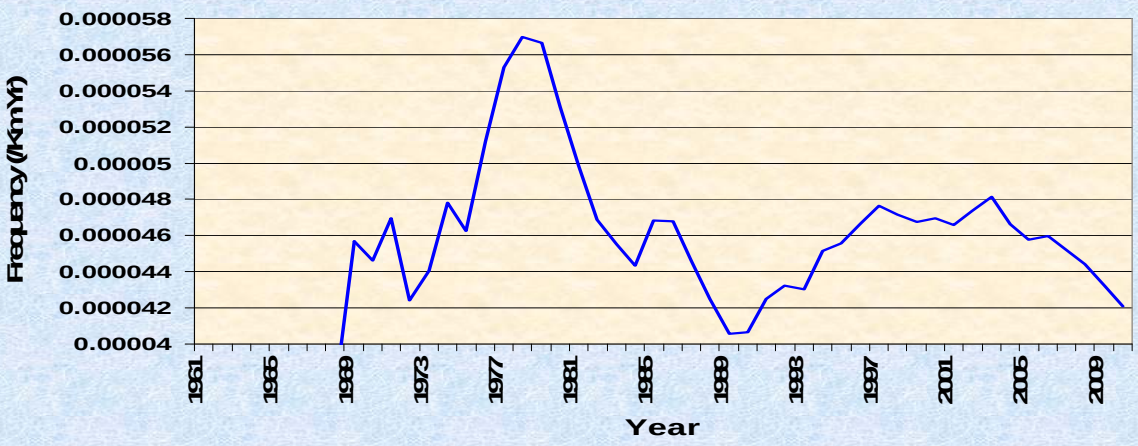
Rupture History 1949-1984



Rupture History 1985-2008



TransCanada Cumulative Rupture Frequency



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TransCanada Pipeline Integrity Management

- **Comprehensive program and use of technology**
  - enhance pipeline safety
  - compliance with codes
- **Uses proprietary quantitative risk assessment process**
  - compliance with corporate safety risk tolerances
  - direct comparison of program costs to risk reduction benefits
- **Consistent approach for all Pipelines**

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Consistent Integrity Management Approach

- **Each line segment is different**

  Blanket approaches do not work

- **Maintenance programs need to be individually tailored for line segment**

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All threats can be managed

- Corrosion = ILI, ECDA, Hydrostatic re-testing
- SCC = HT, ILI
- M & C = Monitoring, HT
- Operations = Procedures, Training
- 3rd party damage = Integrated Public Awareness
- Geotechnical = Monitoring

The level of effort required is line segment specific

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Pipeline Safety – con't

Key concepts to Safe Pipelines

- Safety Culture
- Design, Construction, Operation
- Pipeline Integrity Plans, Processes, Procedures, People
- Know your threats & risks
- Mitigate your risks

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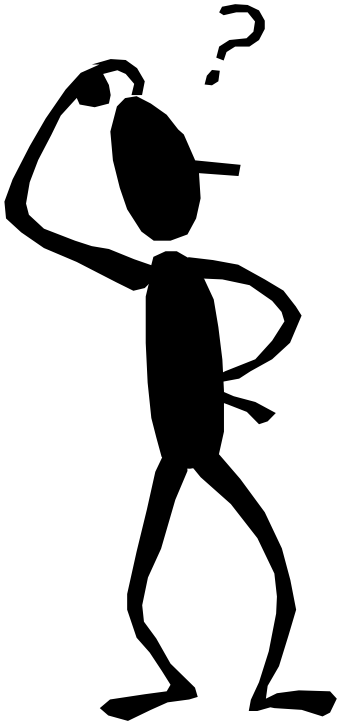
Questions?



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