



Welding and Joining Challenges For the Canadian Regulator and Standards



**Advanced Welding and Joining
Technical Workshop**

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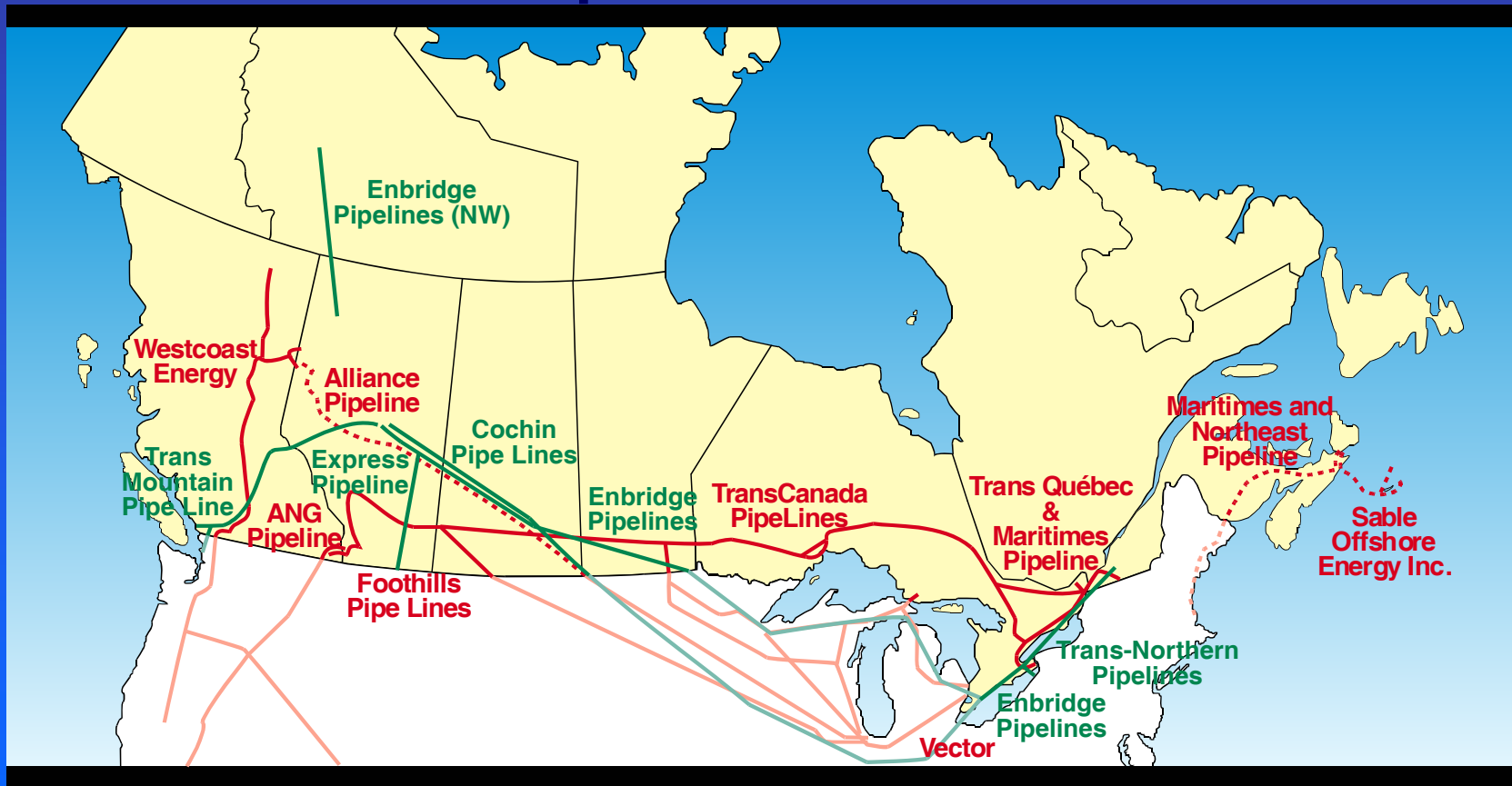


National Energy Board (NEB)

- ◆ Independent tribunal, established in 1959
- ◆ Similar to a combination of PHMSA (OPS) and FERC
- ◆ Staff complement of 300
- ◆ **Regulatory**
 - construction and operation of inter-provincial & international pipelines and international power lines
 - transportation, tolls and tariffs
 - international trade in oil, gas and electricity
- ◆ **Advisory**
 - monitor functioning of energy markets
 - provides advice to Canadian federal government
 - issues public reports (e.g., Energy Supply & Demand reports)



NEB Regulates over 40 000 kms of Major Oil & Gas Pipelines In Canada





Canadian Standard Association (CSA) Oil and Gas Pipeline Systems - CSA Z662

- ◆ Consensus standard with 500 volunteer members in the Oil & Gas program:
- ◆ Used for over 500 000 km of pipe



Typical Oil & Gas Committee
Voting Matrix



Welding and Joining Challenges

- ◆ Reducing Failures
- ◆ Design methods
 - Strain based design
 - Acceptance criteria – ECAs
- ◆ New materials
 - high strength steels X100, X120
 - PE, composites
- ◆ Different fluids being transported
 - Hydrogen, CO₂





Challenges (cont.)

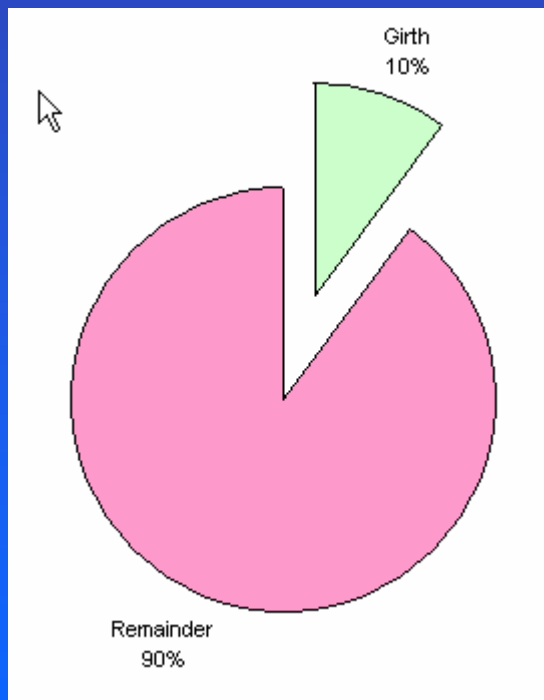


- ◆ Construction practices
 - harsher environments
 - northern pipelines – Mackenzie, Alaska
- ◆ Welding processes - automated
- ◆ Weld Assessment
 - automated UT
- ◆ In- service welding
 - Sour service
 - Hydrogen cracking

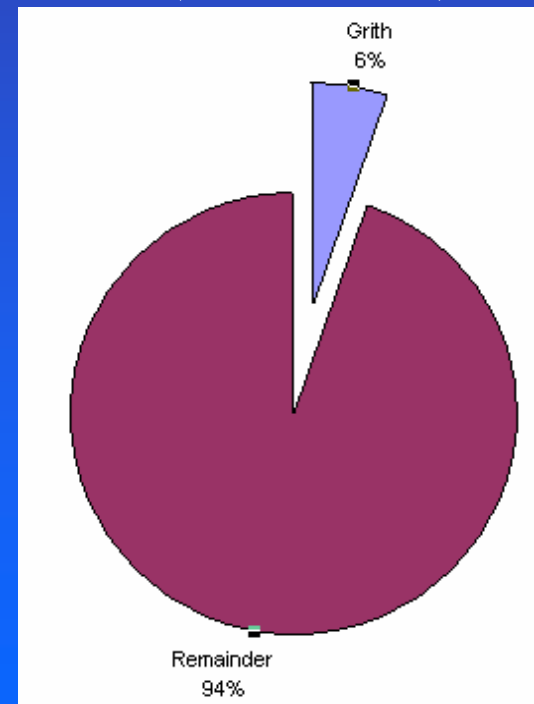


Girth Weld Failures in Perspective

NEB Girth Weld Failures (1950-2004)



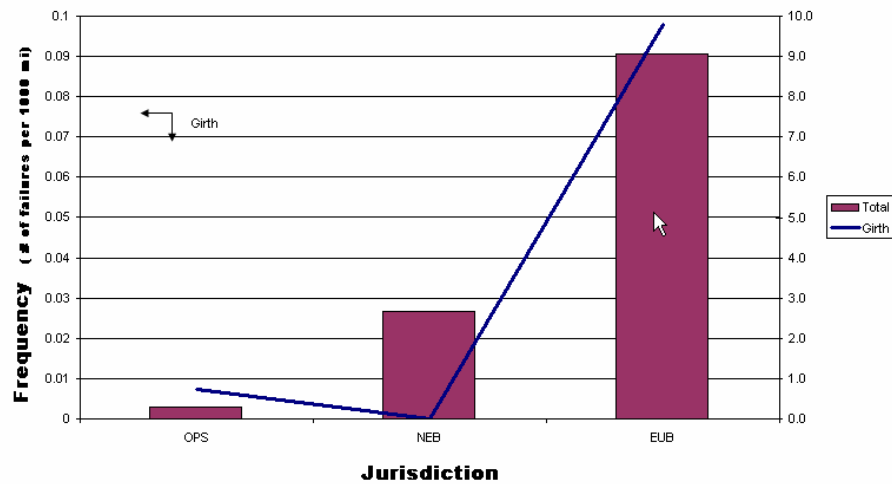
PHMSA (OPS) Girth Weld Failures for Gas Pipelines (1984-2004)





Are Girth Weld Failures a Problem?

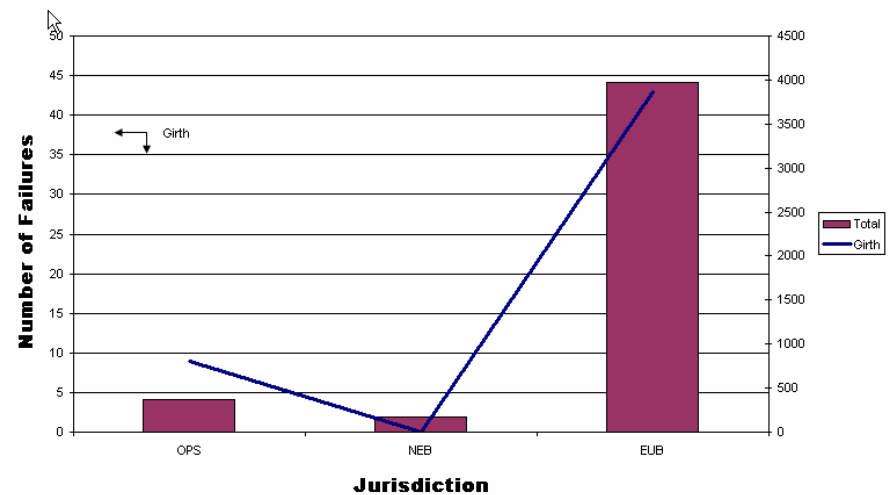
Failure Frequency Comparisons by Jurisdiction (2000 - 2004)



PHMSA (OPS) Failure Frequency for Gas Pipelines

Manageable Problem

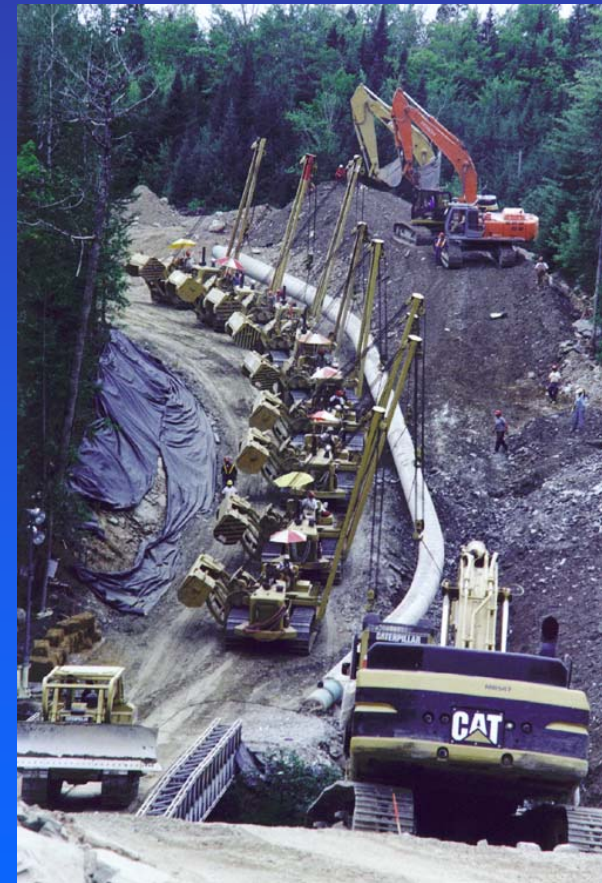
Failure Comparisons by Jurisdiction (2000 - 2004)





Looking Ahead

- ◆ Great history of welding and joining practices
- ◆ Continue to keep up with the challenges posed by new designs, material and maintenance practices
- ◆ Share information to solve problems





Questions



**Goal - To ensure
the integrity of
each joint**