Office national de l'énergie

National Energy Board

Anomaly Assessment and Repair

PHMSA Workshop

NEB Requirements and Expectations

Washington, D.C., 22 October 2008

Canada

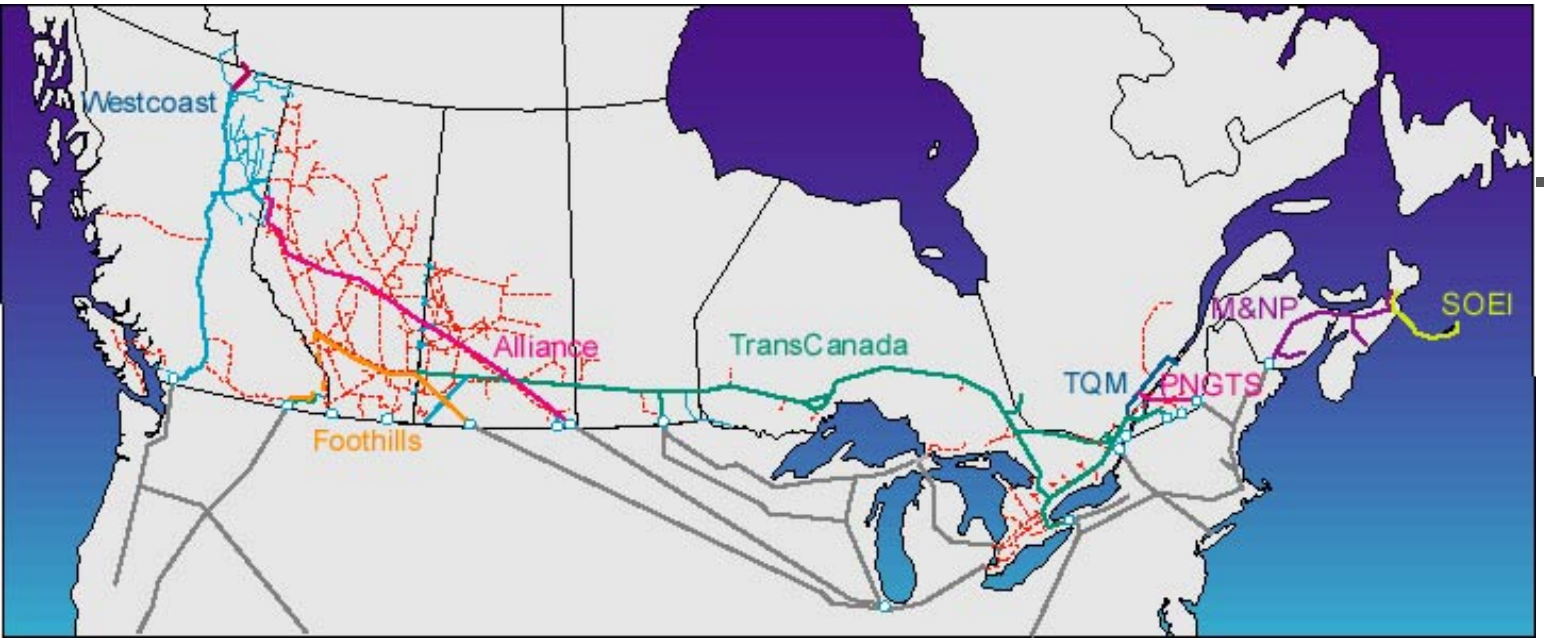
Outline: Anomaly Assessment

- What is the NEB?
  - Purpose
  - Risk-based Life Cycle Approach
- Canadian Anomaly Assessment Requirements
- NEB Audit Expectations: Rationale, Measures and Validation
  - Data and Model Uncertainty: Example
  - Engineering Assessments (i.e. Susceptibility and Suitability)
- Path Forward

National Energy Board (NEB) of Canada

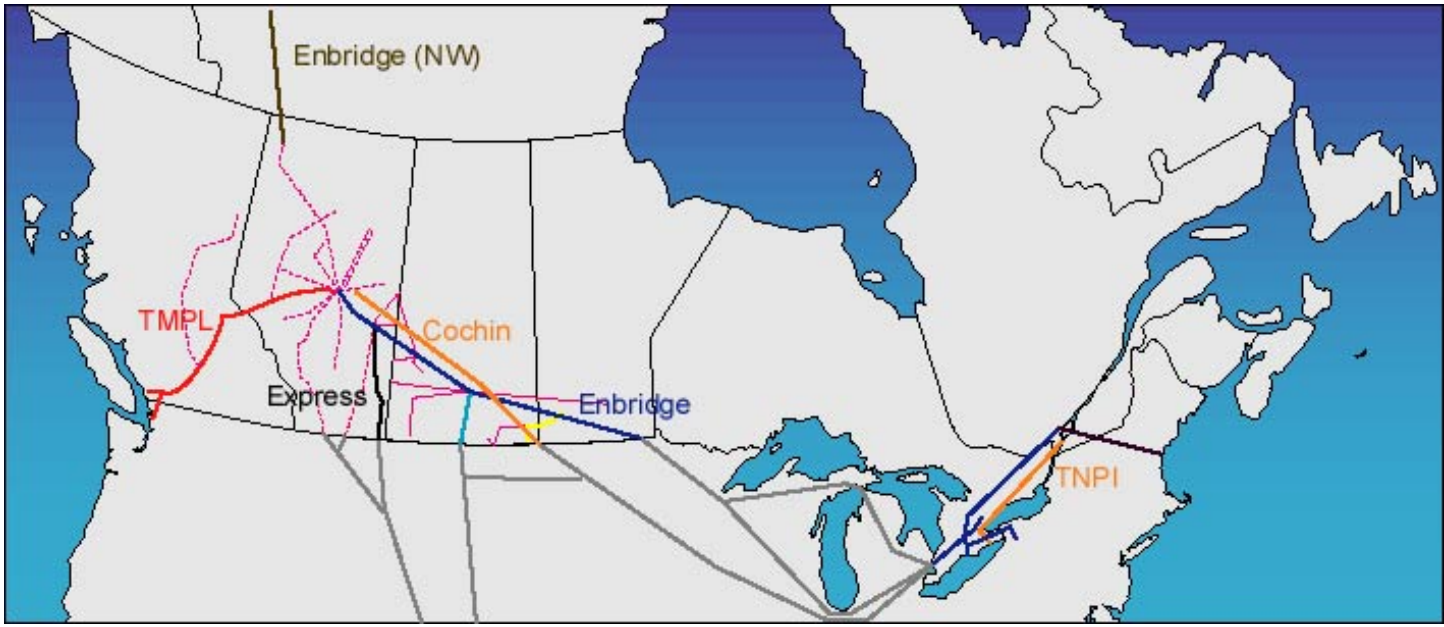
- **Independent tribunal** since 1959 reporting to the Parliament
- **NEB promotes:**
  - Safety and Security
  - Environmental Protection
  - Efficient Energy Infrastructure and Markets

  in the Canadian Public interest!



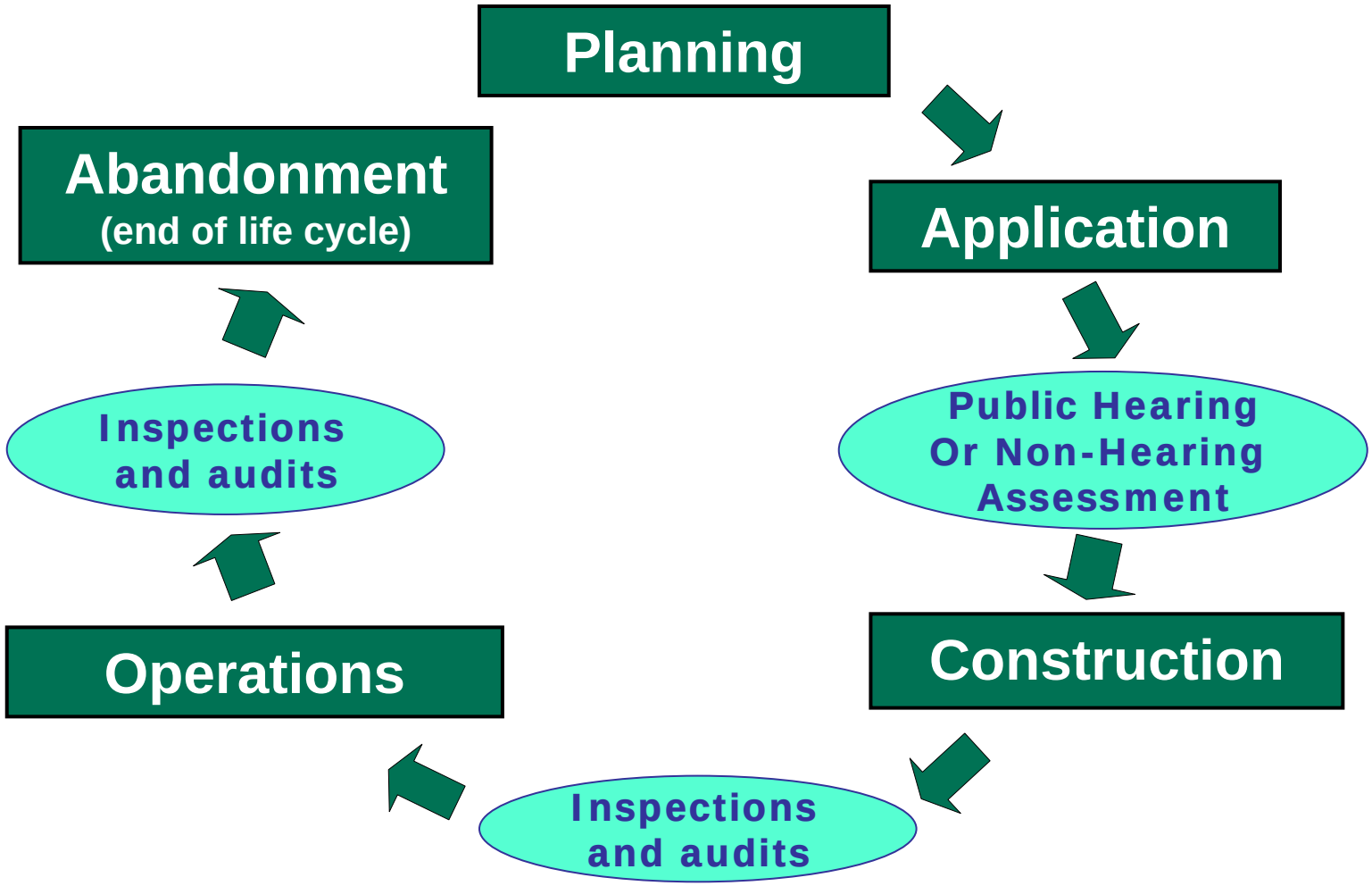
Gas Pipelines

NEB regulates over 45,000 km (28,000 miles) of pipeline systems



Oil Pipelines

NEB Risk-based Lifecycle Approach



NEB Purpose = PHMSA + FERC Purposes

Anomaly Assessment Requirements

Onshore Pipeline Regulations, OPR-99

CSA-Z662-2007 Section 10.9.2.5 **Corrosion Assessment**:

- Maximum Allowable Longitudinal Length
- Minimum Anomaly Failure Pressure (Pfail): PRCI-3-805
  - a) MOP $\leq$ Pfail * Factors (Design, Location, Joint, Temperature)
  - b) Minimum Hydrostatic Testing Requirement

b) Hydrotest Minimum Pressure

Goal: Restore Pipe to Initial Acceptable Conditions (Design or Minimum Hydrotest Pressure)

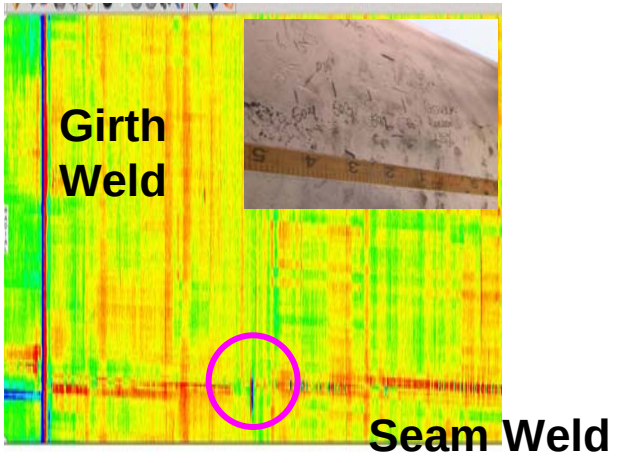
a) Design Pressure [Example: Gas - General]

Class Location for Gas - General -	Location Factor (L)	MOP f (SMYS%)	Design Pressure f(% MOP)
Class 1	1	80%	125%
Class 2	0.9	72%	139%
Class 3	0.7	56%	179%
Class 4	0.55	44%	227%

Service fluid	Class location	Intended minimum pressure*
LVP	All	125% of intended MOP
HVP or CO_2	1	
Gas	1 or 2	
Gas	3 or 4	140% of intended MOP
HVP or CO_2	2, 3, or 4	150% of intended MOP

Audit Expectations: Anomaly Assessment

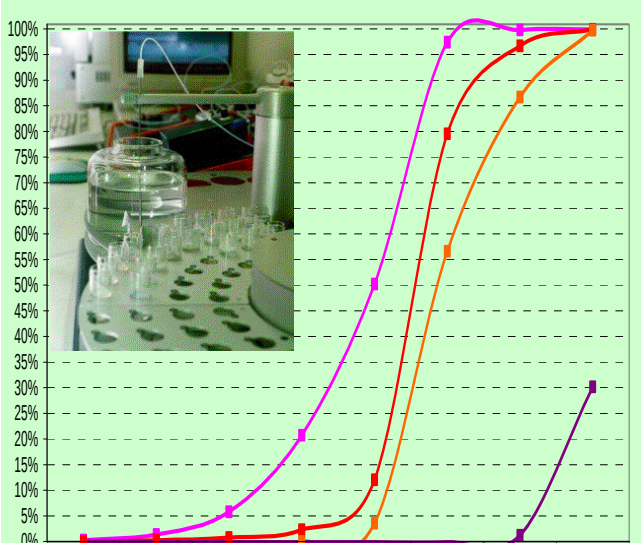
- Accounting for Data and Model Uncertainty
  - Detection, Identification and Sizing
  - Reference: CSA-Z662 Annex D10 Assessment of Report Accuracy



- Conducting engineering assessments

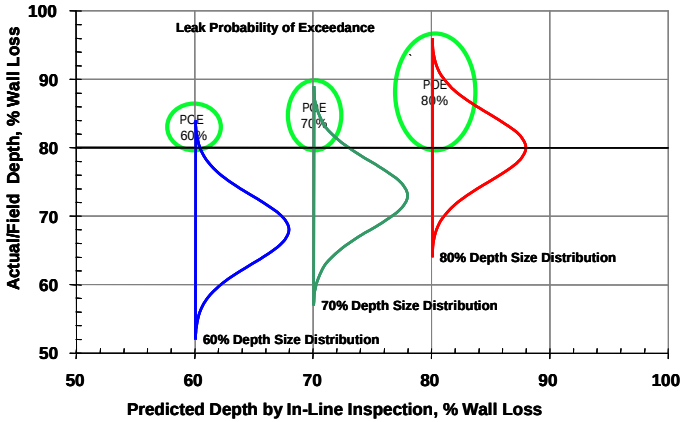
  Susceptible to failure and suitable to continued Service:
  - Reference: CSA-Z662 Chapter 10.14.2.1

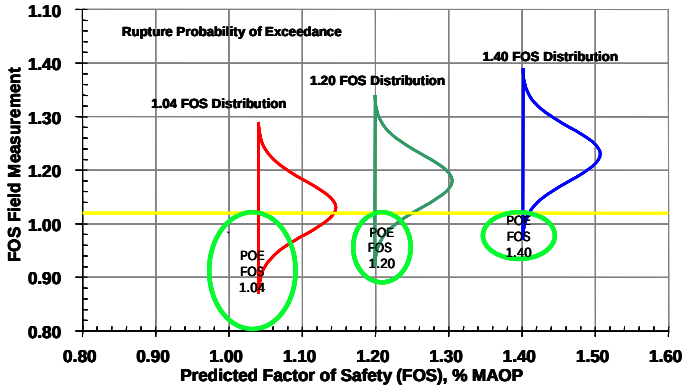
  Rationale, Measures and Validation
  - Corrosion Growth Rates
  - Re-Inspection Frequency

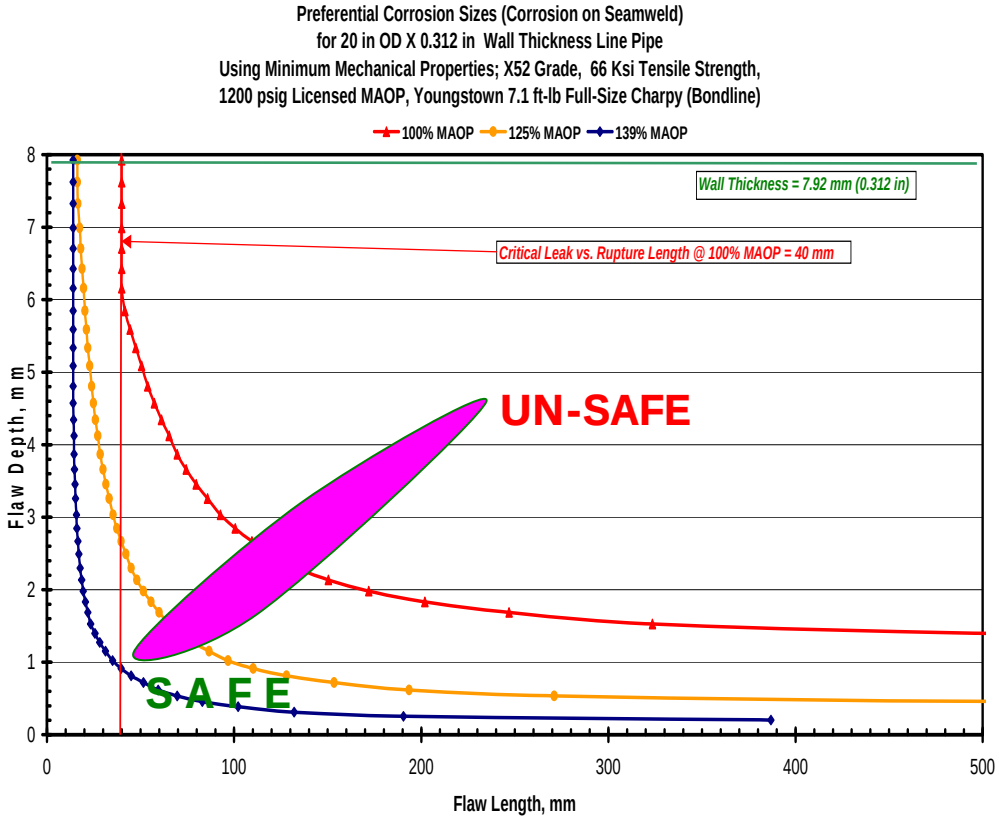


Anomaly Uncertainty and Assessment

Unity Graphs and Uncertainty

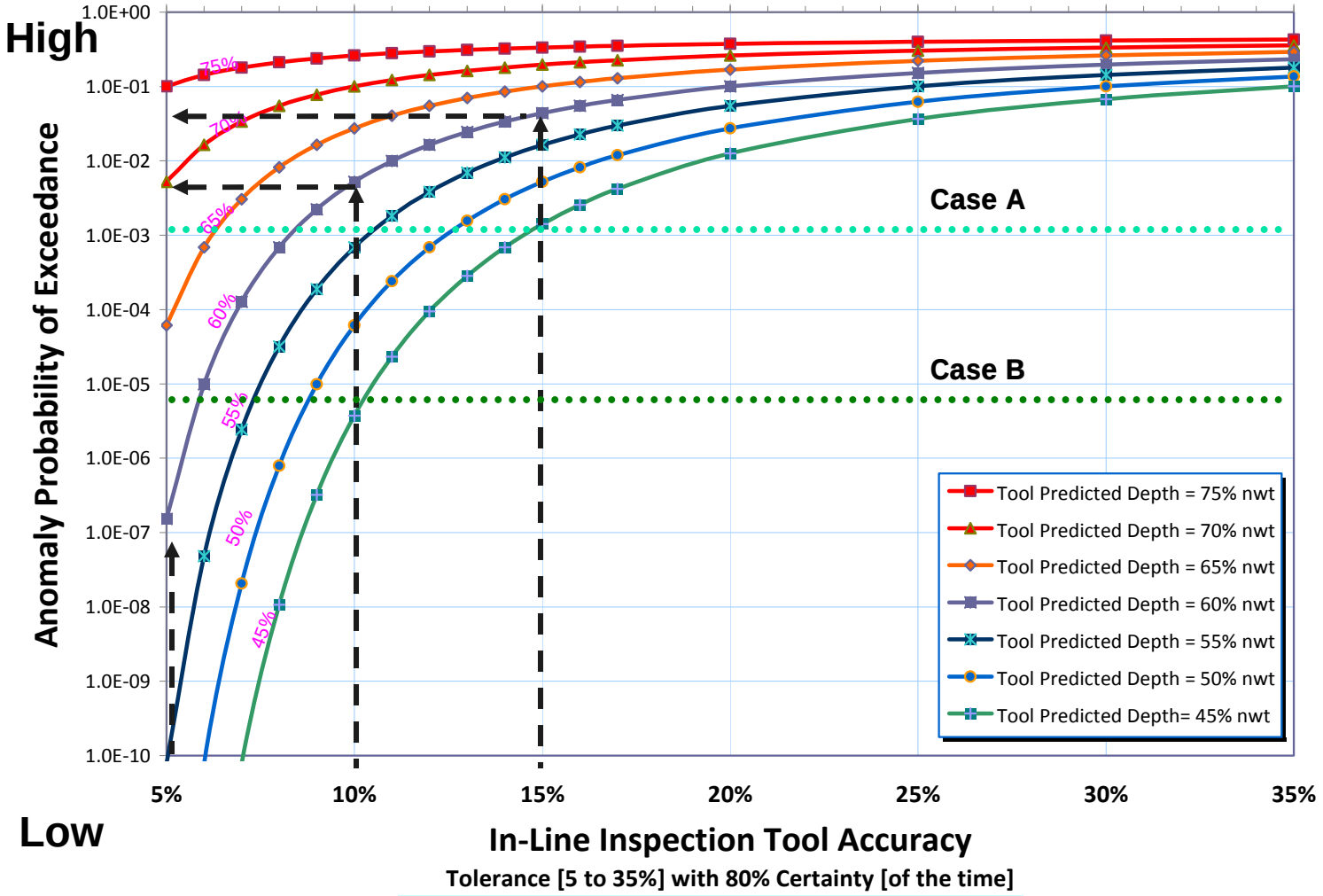






Uncertainty and Criticality Assessment

ILI Anomaly Accuracy Effect on Depth



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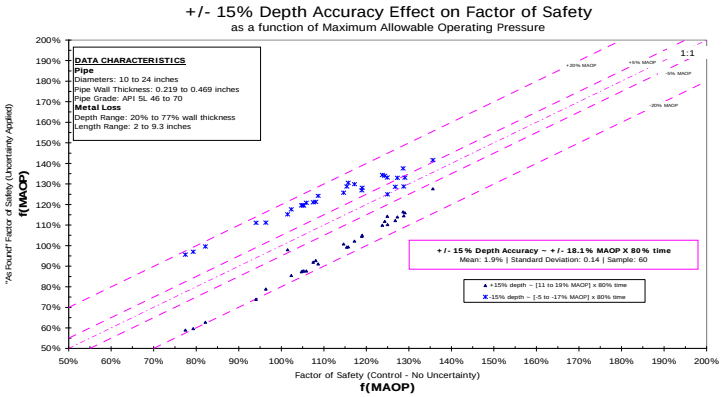
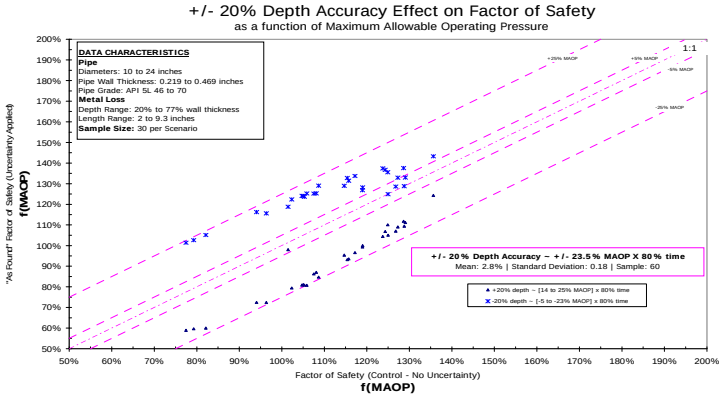
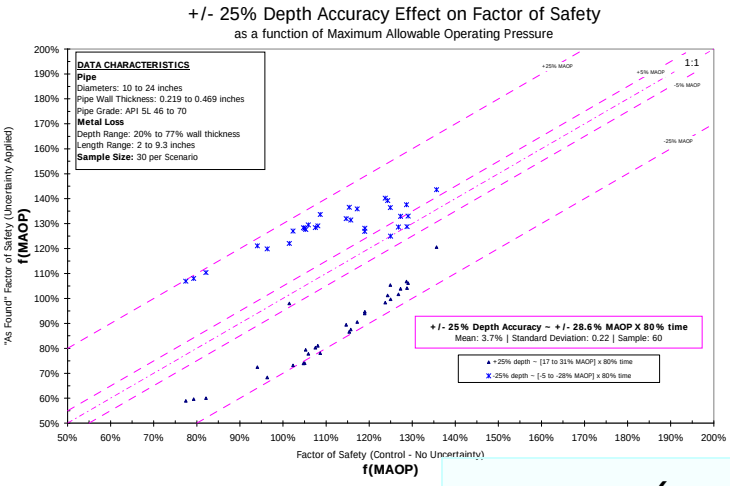
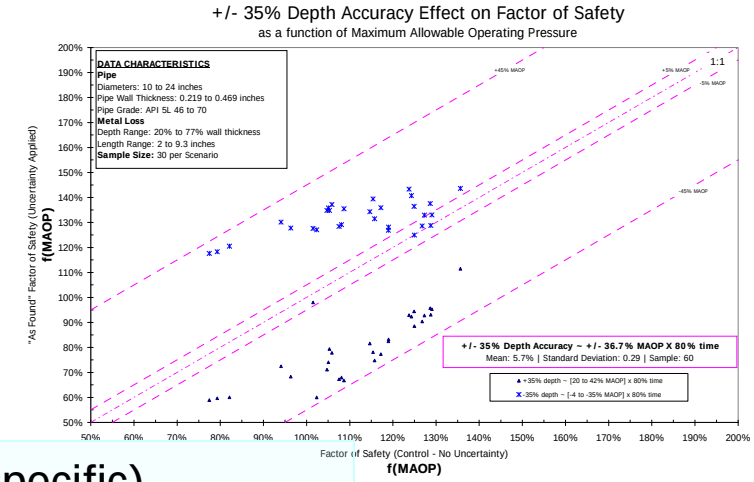
Accuracy Effect on Factor Of Safety (FOS)

+/- 15% Depth ~ 18% FOS









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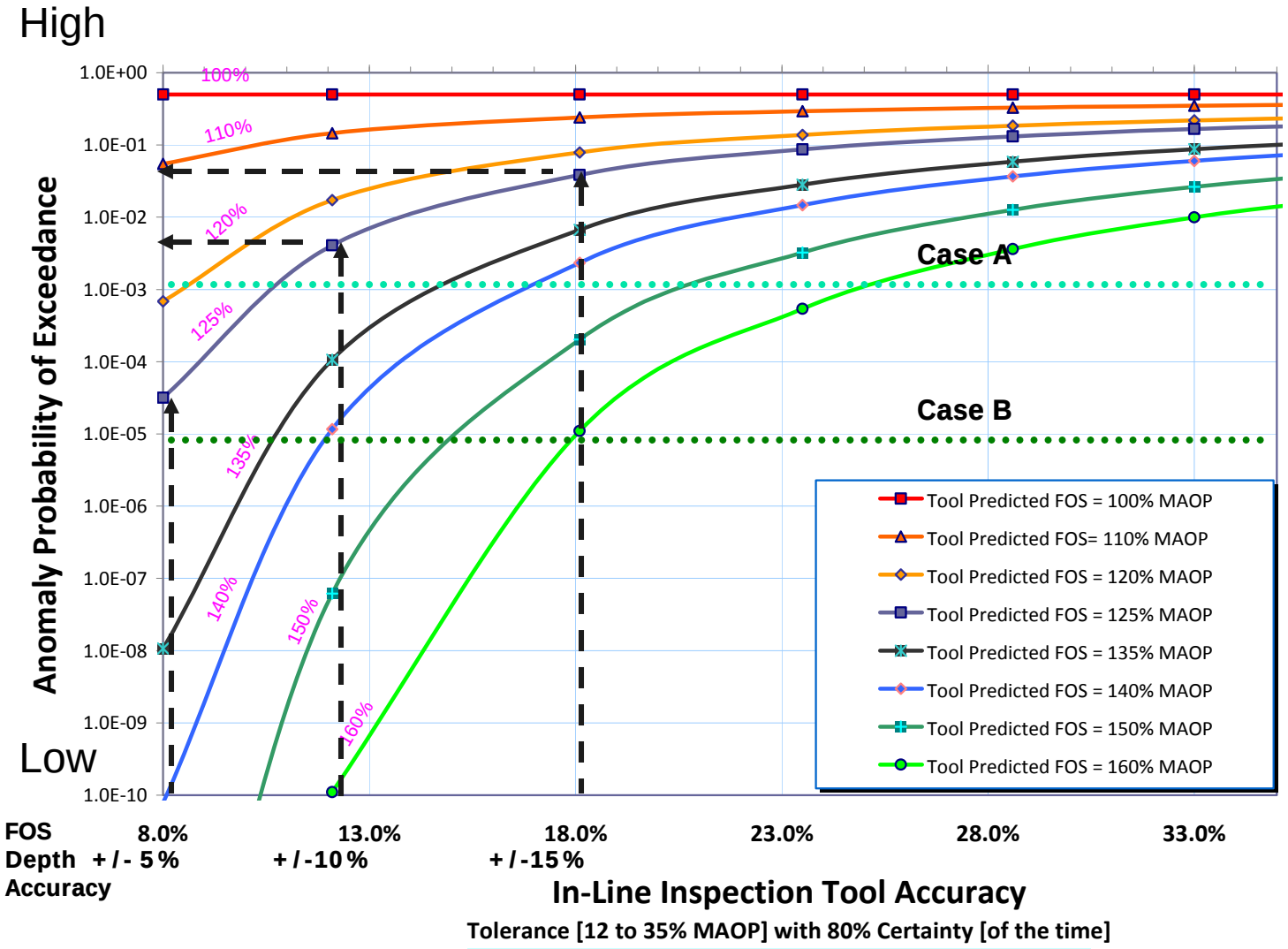
ILI Anomaly Accuracy Effect on FOS



(case-specific)

Path Forward: Anomaly Assessment

- Need for Reporting
  - Hazard Identification and Assessment (i.e. FOS)
  - Preventive and Monitoring (i.e. Growth Rates, Re-Inspection)
- Comparing IMP Effectiveness: US and Canada
- Increasing ongoing data sharing: PHMSA+NEB