A Forum on Pipeline Safety Indicators, and the Needed Transparency of Information to Support Them

Calgary, Alberta
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A Proposal for Canadian Pipeline Safety Indicators, and the Needed Transparency of Information to Support Them

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The Pipeline Safety Trust  
Born from a pipeline tragedy

What happen in Bellingham

- Pipeline was damaged by 3rd party
- Damage known but not fixed
- Valve installed wrong but not fixed
- Valve malfunctioned multiple times
- SCADA failure
- Operator Error
- Pipeline burst and exploded killing 3 youngsters and an entire salmon stream
The Pipeline Safety Trust
Who we are and where we came from?

“... there’s going to be a Trust that’s going to be funded as part of today’s sentencing. With $4,000,000 ... they’ve nowhere near the lobbying potential of the oil industry. It’s not even David and Goliath. It’s more like Bambi and Godzilla. You’ve heard people today that are going to spend their lives trying to make this right, and they should be listened to. No industry polices itself very well... you need outside people, and these are going to be the people so pay attention to them.”

The Honorable Barbara Rothstein
United States District Judge
At Olympic Pipe Line Co Sentencing
Core Belief
Path to Greater Pipeline Safety

Who is in the room?

Public – 20
Regulators – 17
Industry - 18

Pipeline Operators

Regulators

The Public, Local Government, First Nations
Core Belief

Transparency of Information is key to public awareness and education, building trust, and greater pipeline safety.
Core Belief – Fearless Independence

“The Pipeline Safety Trust, a nonprofit advocacy group that stands apart from industry and environmentalists as an independent voice on oil and gas infrastructure, is surveying the public in a potentially groundbreaking effort to improve the sorts of metrics that federal regulators use to track the nation's progress.”

Politico – 4/7/16
Why do this?

Providing transparency so people can learn and decide for themselves.

Getting to Zero Failures
## Who took the surveys?

Table 1. Which one of the following best describes why you are interested in pipeline safety?

<table>
<thead>
<tr>
<th>Reason</th>
<th>Canada</th>
<th>U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have concerns that pipelines enable greater production of fossil fuels, and that such production can have serious impacts on our health, waters or climate</td>
<td>28%</td>
<td>23%</td>
</tr>
<tr>
<td>I have concerns about the fuels pipelines carry and the potential effects on the public and environment should they be released</td>
<td>22%</td>
<td>17%</td>
</tr>
<tr>
<td>I am a landowner with a pipeline on my land, or proposed to be on my land</td>
<td>19%</td>
<td>9%</td>
</tr>
<tr>
<td>I think greater pipeline safety is key to being able to expand energy production, which is important to the economy in Canada/U.S.</td>
<td>14%</td>
<td>2%</td>
</tr>
<tr>
<td>There is a new pipeline proposed nearby, and many concerns have been raised</td>
<td>5%</td>
<td>19%</td>
</tr>
<tr>
<td>I live or work very near a pipeline</td>
<td>5%</td>
<td>8%</td>
</tr>
<tr>
<td>I work for a local government that needs to ensure the safety of our citizens</td>
<td>1%</td>
<td>5%</td>
</tr>
<tr>
<td>I am concerned about effects pipelines may have on First Nations rights and cultural heritage</td>
<td>1%</td>
<td>2%</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>15%</td>
</tr>
</tbody>
</table>
How Important is Access to Information

Overall how important is it to you to have access to information about pipeline safety?

Canada:
- Extremely important: 52%
- Very important: 31%
- Somewhat important: 16%
- Don't know: 1%

U.S.:
- Extremely important: 61%
- Very important: 33%
- Somewhat important: 6%
- Don't know: 0%
Overall how satisfied are you with the kinds of information you can currently easily access regarding pipeline safety?

- **Canada**
  - Very Satisfied: 14%
  - Somewhat Satisfied: 5%
  - Not Very Satisfied: 21%
  - Not At All Satisfied: 30%
  - Don't Know: 2%

- **U.S.**
  - Very Satisfied: 26%
  - Somewhat Satisfied: 4%
  - Not Very Satisfied: 27%
  - Not At All Satisfied: 41%
  - Don't Know: 2%
How helpful would these types of information be in understanding pipeline safety?

<table>
<thead>
<tr>
<th>Category</th>
<th>Extremely helpful</th>
<th>Very helpful</th>
<th>Somewhat helpful</th>
<th>Not very helpful</th>
<th>Not at all helpful</th>
</tr>
</thead>
<tbody>
<tr>
<td>Causes of pipeline failures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maps of where pipelines are in your community</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number and type of enforcement actions taken by regulators against pipeline</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of pipeline failures per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of fuels spilled or unintentionally released per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How a company's safety record compares to national averages</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial costs to clean up spills or respond to pipeline emergencies per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of a pipeline/s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property damage caused per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many people are injured or killed per year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How much a company is spending on pipeline testing, maintenance and repairs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quantity of fuel moved nationally and by individual companies</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Indicators specific to the safety of the pipelines in your community

Indicators that show how well regulators are paying attention

Indicators regarding a particular pipeline or pipeline company

Indicators that allow you to compare particular pipelines or pipeline companies to national averages

Indicators regarding national trends showing whether pipeline safety is improving or declining

Highest Priority Pick of Different Types of Indicators by Different Interest Concerns (Canadian answers only)

- Pipelines enable fossil fuels
- Local Environmental Impacts
- Energy Production/Economy
- Landowners

0.0% 10.0% 20.0% 30.0% 40.0% 50.0%
Percent of People Who Said They Would Trust Any of the Following Organizations to Create and Host Indicators

- PHMSA - Federal pipeline safety regulator - N/A in Canada
- A independent non-profit organization focused on safety
- An environmental organization
- An association of municipalities
- A provincial or state regulator
- The National Transportation Safety Board (TSB or NTSB)
- The NEB (Canada) or FERC (U.S.)
- A private foundation or think tank
- A pipeline industry association
- Don’t know
- None
• 25,000 km of feeder lines
• 250,000 km of gathering lines
• 100,000 km of transmission lines
• 450,000 km of distribution lines
What is an Indicator?
Any of a group of statistical values that taken together give an indication of the health of something.

Merriam-Webster Dictionary

Three Types of Indicators Chosen

• Indicators that show safety trends

• Indicators that show regulatory effectiveness

• Indicators that provide local information
Indicators can raise safety questions

# INCIDENTS per 10,000 MILES OF ONSHORE GAS TRANSMISSION PIPELINE BY DECADE OF PIPE INSTALLED (AVG of ANNUAL INCIDENTS 2005-2013)
Indicators do not have to be graphs or charts
Proposed Indicator – Failure Causes

Failures – U.S. Natural Gas Transmission Pipelines

- **Other Outside Force Damage**
- **Natural Force Damage**
- **Equipment Failure**
- **Weld Failure**
- **Material Failure**
- **Incorrect Operation**
- **Excavation Damage**
- **Internal Corrosion**
- **External Corrosion**
- **All Other Causes**

- **3 Year Average**
- **10 Year Average**
- **20 Year Average**

Failure Causes Analysis:
- Natural Force Damage has a significant percentage across all time frames.
- Equipment Failure shows a notable increase over the years.
- Material Failure has a consistent trend.
- Other Outside Force Damage fluctuates but remains a significant cause.
- Natural Corrosion is consistent across all time frames.
- External Corrosion shows a steady increase.
- Incorrect Operation and Excavation Damage are less significant compared to others.
Drill Down Indicators

Causes of U.S. Gas Transmission Pipeline Failures
2011 - 2015

- ALL OTHER CAUSES: 42%
- CORROSION: 18%
- EXCAVATION DAMAGE: 14%
- INCORRECT OPERATION: 6%
- MATERIAL/WELD/EQUIP FAILURE: 6%
- NATURAL FORCE DAMAGE: 5%
- OTHER OUTSIDE FORCE DAMAGE: 9%
Proposed Indicator – Failure/km/Year

Failures Per Kilometer

- Crude Oil
- Refined Products
- Natural Gas
- HVLs
- CO2
- Produced/Salt Water

Year:
- 2008
- 2009
- 2010
- 2011
- 2012
- 2013
- 2014
- 2015
Drill Down Indicators

Total Crude Oil Pipeline Length in km

<table>
<thead>
<tr>
<th>Year</th>
<th>Length (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>1000</td>
</tr>
<tr>
<td>2009</td>
<td>1030</td>
</tr>
<tr>
<td>2010</td>
<td>1061</td>
</tr>
<tr>
<td>2011</td>
<td>1093</td>
</tr>
<tr>
<td>2012</td>
<td>1126</td>
</tr>
<tr>
<td>2013</td>
<td>1182</td>
</tr>
<tr>
<td>2014</td>
<td>1241</td>
</tr>
<tr>
<td>2015</td>
<td>1303</td>
</tr>
</tbody>
</table>

Crude Oil Pipeline Failures

<table>
<thead>
<tr>
<th>Year</th>
<th>Failures</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>98</td>
</tr>
<tr>
<td>2009</td>
<td>105</td>
</tr>
<tr>
<td>2010</td>
<td>100</td>
</tr>
<tr>
<td>2011</td>
<td>100</td>
</tr>
<tr>
<td>2012</td>
<td>110</td>
</tr>
<tr>
<td>2013</td>
<td>126</td>
</tr>
<tr>
<td>2014</td>
<td>170</td>
</tr>
<tr>
<td>2015</td>
<td>182</td>
</tr>
</tbody>
</table>
Proposed Indicator – Failures That Impact People and the Environment

<table>
<thead>
<tr>
<th>Year</th>
<th>All Failures/km of NEB-Regulated Pipelines</th>
<th>All Failures/km of NEB-Regulated Pipelines That Impact People &amp; the Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>0.0005</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>0.0015</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>0.0025</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>0.002</td>
<td></td>
</tr>
</tbody>
</table>
Proposed Indicator – Quantities of Unintentionally Released Products

**Alberta Volume of Crude Oil Spilled per Crude Oil Pipeline Failure**

**Alberta Total Volume of Crude Oil Spilled from Crude Oil Licensed Pipelines**

**Alberta Licensed Crude Pipeline Failures**
<table>
<thead>
<tr>
<th>Year</th>
<th>Crude Oil</th>
<th>Refined Products</th>
<th>Highly Volatile Liquids</th>
<th>CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>59</td>
<td>23</td>
<td>66</td>
<td>2</td>
</tr>
<tr>
<td>2009</td>
<td>26</td>
<td>12</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>2010</td>
<td>54</td>
<td>10</td>
<td>101</td>
<td>9</td>
</tr>
<tr>
<td>2011</td>
<td>38</td>
<td>30</td>
<td>62</td>
<td>101</td>
</tr>
<tr>
<td>2012</td>
<td>13</td>
<td>11</td>
<td>83</td>
<td>2</td>
</tr>
<tr>
<td>2013</td>
<td>33</td>
<td>15</td>
<td>173</td>
<td>2</td>
</tr>
<tr>
<td>2014</td>
<td>12</td>
<td>17</td>
<td>35</td>
<td>70</td>
</tr>
<tr>
<td>2015</td>
<td>13</td>
<td>8</td>
<td>187</td>
<td>29</td>
</tr>
</tbody>
</table>
Proposed Indicator – Monetary Impacts from Releases

Monetary Impacts of 2015 U.S. Hazardous Liquid Pipeline Failures

- Other costs: $27,815,158
- Cost of environmental remediation: $43,030,724
- Cost of emergency response: $125,196,488
- Property Damage - cost of pipeline company damage and repairs: $45,243,233
- Cost of commodity lost: $2,675,544
- Property Damage - public and non-Operator private property: $2,975,424

Monetary Impacts of Pipeline Failures in the U.S.

- Natural Gas Transmission Pipelines
- Hazardous Liquid Transmission Pipelines
Proposed Indicator – Near Misses That Could Indicate Problems or Potential Future Failures

2014 Excavation Damages to U.S. Natural Gas Pipelines Without Releases

- Excavation Practices Not Sufficient: 16,072
- Notification NOT Made: 397
- Locating Practices Not Sufficient: 8,206
- Notification Practices Not Sufficient: 1,917
- Miscellaneous Root Cause: 12,710

Number of Incidents of Operation Beyond Design Limits on NEB Regulated Pipelines

- 2008: 0
- 2009: 10
- 2010: 20
- 2011: 6
- 2012: 37
- 2013: 42
- 2014: 5
- 2015: 13
Proposed Indicator – Quantities of Product Transported

Canadian Crude Oil Exports - By Export Transportation System
Summary - 5 year trend

Canadian Crude Oil Exports by Rail - 2015 *

2015 Canadian Crude Oil Exports by Rail - 6,455,923 m³
Proposed Indicator – All of the above for individual companies

The 8 Longest Natural Gas Transmission Pipelines in the U.S.

- **10 Year Average (incidents per 1,000 kilometers)**
- **5 Year Average (incidents per 1,000 kilometers)**

<table>
<thead>
<tr>
<th>Pipeline Company</th>
<th>10 Year Average</th>
<th>5 Year Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANSCONTINENTAL GAS PIPE LINE COMPANY</td>
<td>0.400</td>
<td>0.350</td>
</tr>
<tr>
<td>TEXAS EASTERN TRANSMISSION, LP</td>
<td>0.250</td>
<td>0.220</td>
</tr>
<tr>
<td>NATURAL GAS PIPELINE CO OF AMERICA</td>
<td>0.300</td>
<td>0.280</td>
</tr>
<tr>
<td>ANR PIPELINE CO</td>
<td>0.350</td>
<td>0.330</td>
</tr>
<tr>
<td>EL PASO NATURAL GAS CO</td>
<td>0.200</td>
<td>0.180</td>
</tr>
<tr>
<td>COLUMBIA GAS TRANSMISSION, LLC</td>
<td>0.320</td>
<td>0.300</td>
</tr>
<tr>
<td>TENNESSEE GAS PIPELINE COMPANY</td>
<td>0.450</td>
<td>0.420</td>
</tr>
<tr>
<td>NORTHERN NATURAL GAS CO</td>
<td>0.380</td>
<td>0.350</td>
</tr>
<tr>
<td>U.S. AVERAGE (Operators with over 161 kilometers of pipeline)</td>
<td>0.250</td>
<td>0.220</td>
</tr>
</tbody>
</table>

Significant Incidents Per 1000 Kilometers
Indicators That Provide Locally Important Information

- Pipeline Map
- Basic Pipeline Segment Attributes (diameter, pressure, age, type of pipe)
- Pipeline Company & Contact Info
- Pipeline Segment Inspection Info
- Pipeline Segment Failure Data
- Pipeline Past Enforcement Info
- Products transported and volume Info
- Emergency Response Plans
Proposed Indicator – Regulatory Effectiveness

Significant Incidents Within A Pipeline Operator's Control Where PHMSA Has Authority vs. PHMSA Civil Penalty Cases Initiated

- PHMSA Civil Penalty Cases Initiated
- Significant Incidents
Comparison of Regulatory Effort to Pipeline Failures

- Regulatory Hours Spent on Cases of Excavation Damage to Pipelines
- Number of Pipeline Failures from Excavation Damage

Chart showing the trend of regulatory hours spent on excavation damage cases and the number of pipeline failures from 2006 to 2015.
Barriers to making it work

Will barriers be an excuse to not move forward, or will workarounds be agreed to?
Some of the Major Barriers

Lots of independent agencies, with varying authorities and cultures, and differing views on the importance of public outreach, education, involvement and transparency.
Some of the Major Barriers

Reporting requirements and data collection – Lack of harmonization between agencies regarding what data is collected, definitions, reporting thresholds, etc.
Some of the Major Barriers

Is Industry supplying accurate data?

Is anyone checking?
Some of the Major Barriers

Statistical validity of data from low frequency events

Cubic Meters of Natural Gas Released / Kilometer of Pipeline

<table>
<thead>
<tr>
<th>Year</th>
<th>NEB Pipelines</th>
<th>PHMSA Pipelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>52.90</td>
<td>92.96</td>
</tr>
<tr>
<td>2012</td>
<td>0.01</td>
<td>109.92</td>
</tr>
<tr>
<td>2013</td>
<td>393.82</td>
<td>82.31</td>
</tr>
<tr>
<td>2014</td>
<td>0.01</td>
<td>121.50</td>
</tr>
<tr>
<td>2015</td>
<td>2.73</td>
<td>103.05</td>
</tr>
</tbody>
</table>
Some of the Major Barriers

Does the public trust what regulators and industry are telling them?
A Case For Cross-Border Indicators

• Many of the same companies operate on both sides of the border

• The concerns are similar on both sides of the border

• More data provides better statistical validity of trends for low frequency events

• Allows apple to apple comparison of different regulatory approaches
Next Steps?
Info regarding this Indicator Project can be found at: http://pstrust.org/trust-initiatives-programs/pipeline-safety-indicators/