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

Pipeline Safety TRUST

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In the public interest.

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Background on the Pipeline Safety Trust

Mission

The Pipeline Safety Trust promotes pipeline safety through education and advocacy, increased access to information, and partnerships with residents, safety advocates, government, and industry, resulting in safer communities and a healthier environment.

The Pipeline Safety Trust came into being after a pipeline disaster that occurred nearly seventeen years ago - the 1999 Olympic Pipeline tragedy in Bellingham, Washington that left three young people dead, wiped out every living thing in a beautiful salmon stream, and caused millions of dollars of economic disruption. While prosecuting that incident the U.S. Justice Department was so aghast at the way the pipeline company had operated and maintained their pipeline, and equally aghast at the lack of oversight from federal regulators, that they asked the federal courts to set aside money from the settlement of that case to create the Pipeline Safety Trust as an independent national watchdog organization over both the industry and the regulators.

Since our incorporation in 2003 the Pipeline Safety Trust has worked with nearly every imaginable pipeline safety stakeholder group to increase the safety of pipelines in North America. This includes local governments, community organizations, First Nations, landowner groups, environmental organizations, state and federal pipeline regulators, pipeline industry associations, specific pipeline companies, concerned citizens, legislators, and the media. We believe we are the only non-profit organization that focuses on pipeline safety at a national level from a public interest point of view. We pride ourselves in maintaining our proactive strategies and our fearless independence. Politico recently referred to us as ***"a nonprofit advocacy group that stands apart from industry and environmentalists as an independent voice on oil and gas infrastructure***."

We have been invited to testify to the U.S. Congress 18 times, and have successfully changed pipeline safety regulations at the federal, state, and local levels. Our push for greater public access to pipeline safety information has made huge amounts of information regarding pipeline locations, incidents, inspections, spill planning, and enforcement more easily available in the United States. We have used that information to point out areas where pipeline safety could still be improved, and our efforts were honored in 2015 when we were recognized as a "Champion of Change" at the White House.

What is Pipeline Safety?

The term "pipeline safety" means different things to different people and organizations. Because our intent is to measure pipeline safety, it is important to define it clearly. For the purposes of this project we define pipeline safety as the entire continuum of efforts, including route planning, design, construction, operations, maintenance, testing, inspections, and regulations that would ensure that the product that is put in one end of a pipeline makes it to the other end of the pipeline without any releases. There are many other important issues that relate to the products pipeline carry, such as the effects of how they are extracted from the earth, how they are refined, and ultimately how consumers use them. While such issues are certainly associated with pipelines when one looks at the bigger picture of energy use and impacts, they have not been included in this focused effort on "pipeline safety."

Experience With Pipeline Safety Indicators & Transparency

Since our formation one of the highest priorities for the Pipeline Safety Trust has been to make more pipeline safety information easily available to the public, and to provide that information in ways that are understandable. One of our core beliefs is that such easily available, accurate information should help drive discussions about how safe pipelines are, whether that safety is improving or declining, and help us all focus on where improvements are needed.

By continually raising the issue of the need for greater transparency of pipeline safety information we have often found willing partners in those efforts in pipeline safety regulators. The federal regulator in

the United States, the Pipeline and Hazardous Materials Safety Administration (PHMSA) has now made easily accessible on their website pipeline maps, incident data, enforcement data, pipeline replacement data, state regulator performance metrics, information on specific pipeline operators, etc. The NEB has also more recently begun to make available pipeline safety indicators, pipeline incident map, limited incident data, individual company inspection & compliance & enforcement reports, etc.
Staff from the Pipeline Safety Trust has served on PHMSA's Hazardous Liquid Pipeline Safety Technical Advisory Committee, and the governor appointed Washington State Citizen Committee on Pipeline Safety for over a decade. We currently serve on two PHMSA Data Quality and Analysis Teams – one for hazardous liquids and one for natural gas. One of our recurring messages to PHMSA and to Congress is the need for more transparency and measurable metrics. For the past five years we have reviewed and rated the pipeline safety websites of all 50 states each year as a way to push greater transparency of information.

In 2013 we were invited to provide a keynote speech at the National Energy Board 's (NEB) first Safety Forum. At that forum we made clear that the public expects more transparency of information regarding pipeline safety performance, and challenged both the industry and regulators in Canada to do a better job of making information easily available to help build trust in pipeline safety. For the past two years our executive director has served on the Canadian Energy Pipeline Association's (CEPA) External Advisory Panel where he has helped review and comment on the implementation and indicators used in CEPA's relatively new Integrity First initiative.

What Is This Project All About and Where Did It Come From?

The project is meant to propose some high-level pipeline safety indicators that represent issues that the public is interested in, and will help people to quickly better understand the current safety of pipelines in Canada as well as serve as indicators overtime of whether safety is improving or declining. An indicator is something that helps you understand where you are, which way you are going and how far you are from where you want to be. A good indicator alerts you to a problem before it gets too bad and helps you recognize what needs to be done to fix the problem. This project will also discuss what pipeline safety information needs to be made more easily publicly available so anyone can verify on their own all the indicators proposed. For the purposes of this project we have not included any review or data regarding natural gas distribution pipelines (the relatively smaller, lower pressure pipelines that deliver natural gas to homes and businesses). In Canada the regulatory oversight and data collection for gas distribution pipelines is diverse and confusing, putting that effort beyond the scope of this project.

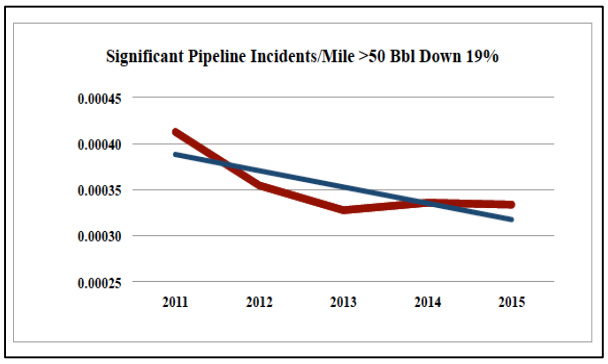
What is an Indicator?

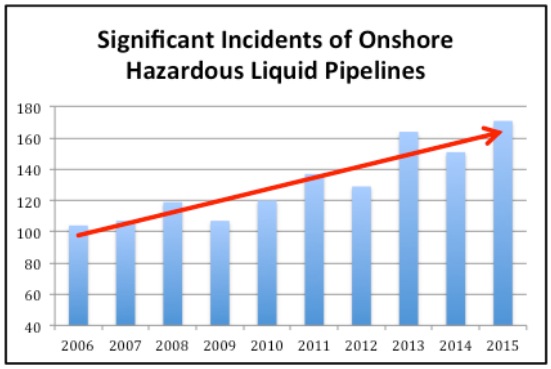
Any of a group of statistical values that taken together give an indication of the health of something.
Merriam-Webster Dictionary

Measurable variable used as a representation of an associated (but non-measured or non-measurable) factor or quantity.
Businessdictionary.com

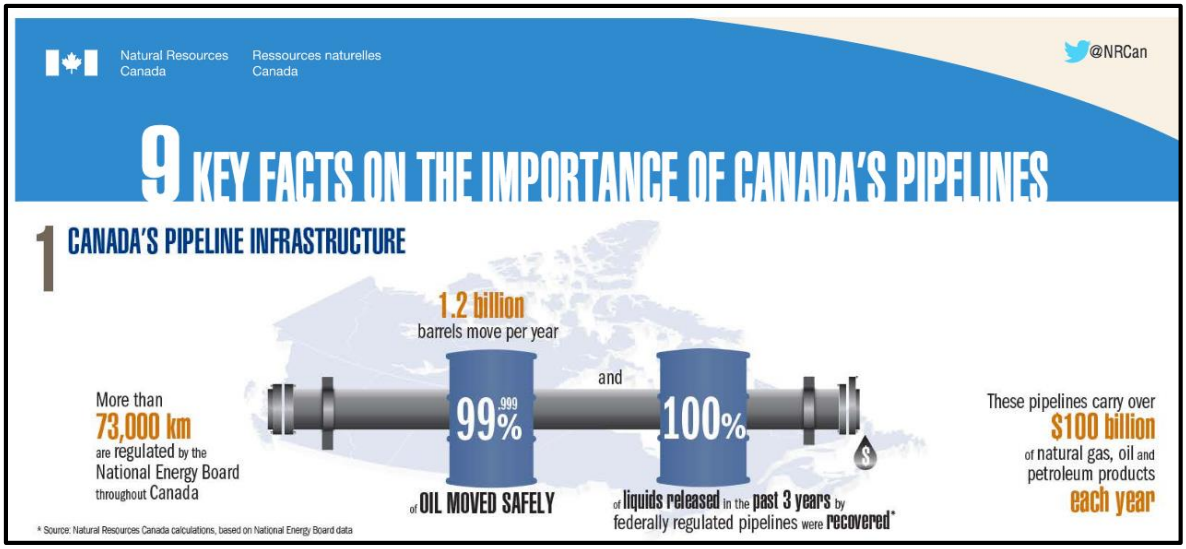
Both the pipeline industry and the regulatory community have recognized the need for such indicators and greater transparency of information, and in many cases have already developed and been using some indicators. For examples, you can view some of CEPA's indicators here, the NEB has a pipeline Safety Performance Portal, and the Alberta Energy Regulator provides a good deal of information on their "Compliance Dashboard". In the United States, PHMSA has been making more and more data available, and recently started to provide a good portion of that information on their National Pipeline Performance Measures portal. Industry groups in the U.S. have also been using indicators to tell a pipeline safety story for a few years now as well. Public interest organizations like the Pipeline Safety Trust and environmental organizations have also started to use the data now being made available to create indicators that help explain their concerns.

Unfortunately, often all of the above groups use indicators to only tell a piece of the pipeline safety story, and that piece is too often meant to support a certain view or purpose. For example the two charts below were used in a Congressional hearing this past February to indicate the trend in significant pipeline incidents in the U.S. They were both developed using PHMSA supplied data, and both are accurate. Can you guess which indicator the Association of Oil Pipelines developed and which was developed by the Pipeline Safety Trust?





Another one of our favorite indicators that CEPA tweeted in April was the one below from Natural Resources Canada where they claim that 100% of liquids released from NEB regulated pipelines in the past three years were recovered. Well that sounded suspicious to us since anyone who tracks pipeline spills knows you are lucky to recover 75% of what spills (the U.S. recovery rate over the past 5 years for crude oil and refined products is 62%). It is unclear which three years they were referring to, but since this appears to have been posted in 2014 we looked at the NEB spills for 2012–2014, and also for 2010–2014. What we found was that the recovery rate for the three years 2012-2014 was 76.8%, and the recovery rate for the five years 2010 – 2014 was 85.7%. Those are good recovery rates, but certainly not 100%.



Because of the frustration and lack of trust that such conflicting and confusing indicators create, some within the pipeline industry, and the regulatory and public interest communities, have come together to try to identify some agreed upon indicators that tell a holistic and accurate picture of pipeline safety. CEPA, knowing that we were engaged with the federal regulators and industry on such an effort in the U.S., approached us last year to see if the Trust had any interest in helping get such a meaningful indicator project started in Canada. They recognized that without significant public involvement in the creation of indicators meant for the public, the end product could suffer from a lack of trust and support. They challenged us to design a small number of high-level indicators based on public desires and not to feel constrained by the reality of existing information collection or lack of harmonization

between industry and regulators. In essence they said to us – tell us what pipeline safety indicators would you want to be able to see if you were king of the world. After much discussion, since the Pipeline Safety Trust normally will not accept money from the pipeline industry, we decided this was an important enough project that we accepted a no-strings attached donation from CEPA to cover our costs and to provide travel assistance funding so representatives from local governments and non-governmental groups across Canada could attend a Forum to discuss the indicators we propose.

Who is the public and why is their involvement important?

We believe that pipeline safety is like a three-legged stool with the industry, regulators and public each serving as one leg of the stool and each playing a crucial role. If any leg of the stool falters, pipeline safety is at risk.

The industry uses its vast resources to install, operate and maintain pipelines. The regulators verify through inspections and data collection that the minimum safety regulations are appropriate and are being met, and when necessary, use enforcement authority to ensure compliance. The public, including local government, and First Nations officials, serve as the watchdogs to push for greater regulation and enforcement when necessary, and to make sure complacency doesn't set in. Unfortunately, the public is often the weakest leg of the stool, only paying attention when they are impacted, and often lacking the necessary information and resources to adequately engage.

The public can only do its job if there is adequate transparency in what the industry and the regulators are doing. Adequate performance, inspection, and enforcement data needs to be easily publicly available so compliance can be verified. Adequate information about the specifications, contents, and routes of proposed pipelines also need to be easily available so people living in potentially affected neighborhoods can decide for themselves if adequate safety precautions have been taken. The information that decision makers use to make pipeline safety decisions also needs to be available to the public so they can decide whether their officials are making decisions with full knowledge of the impacts and with the public's safety and welfare in mind.

For the purposes of this project we did not try to survey the entire range of the "public." We focused our efforts on the "skeptics", those who for one reason or another had voiced concerns about pipeline safety. We did this because they are the ones paying attention, and they are also the ones looking for information and often steering the public discussions of pipeline safety. The amount of attention that the public is paying to pipeline safety is at an all time high. As the Office of the Auditor General of Canada noted in their 2015 audit of NEB performance:

> ***"public attention to pipeline projects has increased, as reflected in the number of people seeking to participate in project approval hearings. Recent incidents, such as pipeline ruptures in Kalamazoo, Michigan, and near Fort McMurray, Alberta, although not related to pipelines regulated by the National Energy Board, have contributed to this attention. There has also been an increase in interest on issues such as climate change, greenhouse gas emissions, cumulative environmental effects, and the effects of pipelines on Aboriginal groups."***

Our Research Effort

Even though the Pipeline Safety Trust has worked with citizen organizations for well over a decade, and frequently is asked to represent the public's interest by regulators, the pipeline industry, and elected officials, we felt it was important for us to reach out and gauge the opinions of the public on what

information and indicators they would find of value. This was particularly important in Canada where our previous efforts have been limited. We also thought this was important because the Pipeline Safety Trust is a made up of a small number of fairly like minded individuals all in the United States who certainly cannot completely represent the diverse opinions of the entire "public."

To conduct the survey in Canada we hired the independent social scientific research and program evaluation firm Applied Research Northwest. They worked with us to design the survey and they then were responsible for its programming, launch, data collection, analysis, and reporting. The link to the web-based survey was initially directly emailed to 254 individuals from conservation and environmental groups, landowner groups, municipal associations, as well as citizens with known interests and activities related to pipeline safety efforts. Each individual was asked to share the survey link with others they thought might be interested. We know that the Canadian Association of Energy and Pipeline Landowner Associations and the Atlantic Chamber of Commerce shared the survey with their members. In the end 134 people from 9 provinces submitted complete surveys. Applied Research Northwest's final report on the Canadian survey can be found here.

About a month after the Canadian survey was completed the Pipeline Safety Trust conducted the same survey to the same type of audience in the U.S. We did this to see if there were any clear differences between answers received in Canada versus the U.S. 240 people from 31 states completed that survey. The results of the U.S. survey can be found here.

Staff members also reviewed the websites of the NEB, and all provincial regulators to determine differences in pipeline safety regulations, what pipeline safety information, data, and indicators are already easily publicly available, and to get a general sense of the reporting requirements for each regulator. We also reviewed the CEPA website along with the websites of some major pipeline companies to see what types of information and indicators they were making available to the public.

"Every one of the regulators has a different reporting threshold, and some of us also have different types of incidents, so getting some consistency is important,"
Chris Loewen, VP of Operations, NEB

In January we spent a day with NEB staff in Calgary talking with them about this project and listening to the associated efforts they have underway. We also reviewed some limited information that shows that provincial regulators in the west, through the Western Regulator's Forum, have also identified the lack of consistency in data collection and have started work on greater harmonization to create a one-window approach in communicating pipeline safety indicators. It would appear the time is ripe for the public to make their desires known in this arena. Finally, in an attempt to better understand the data already collected by Canadian regulators, and to perhaps use that data to produce samples of proposed indicators, we obtained complete incident data sets from the NEB and from the Alberta Energy Regulator (AER). We were surprised that in both cases neither data set was easily publicly available online as they are in the United States. Because of our earlier contacts with NEB staff obtaining the data from NEB was quite easy for us, but we don't know what process the public would need to go through to obtain it. In the case of the AER obtaining the data was relatively easy once we found someone who could explain the process for us, and which data set actually contained failure information. AER charges $367 for this data, which would tend to be a significant disincentive for many to obtain and use it.

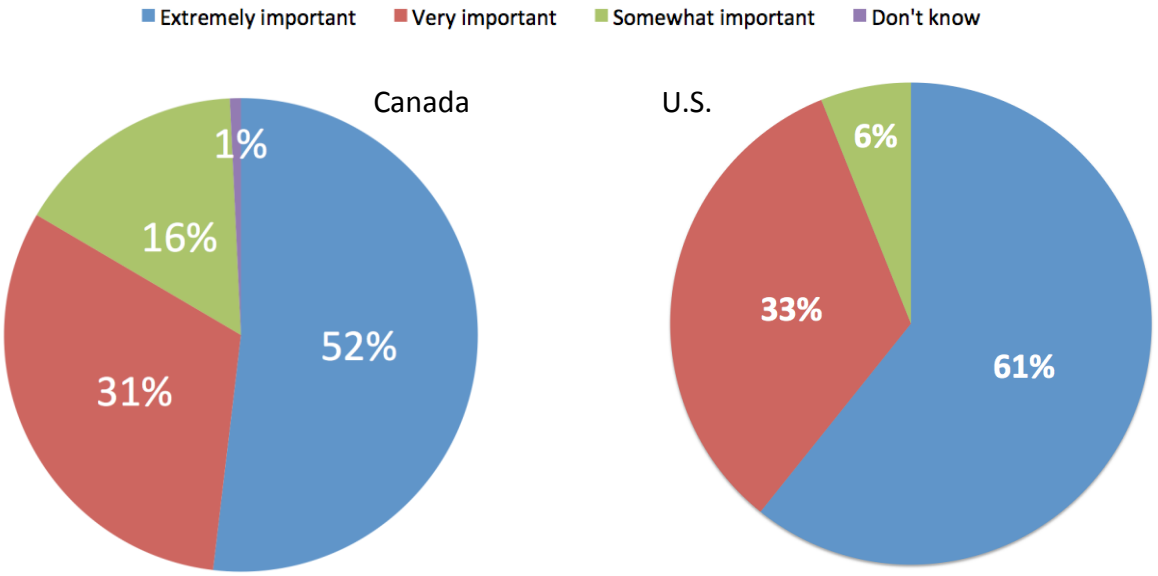
Survey Findings

The surveys we did in Canada and the United States were not designed to be comprehensive in terms of different stakeholder groups surveyed, or carefully controlled so as to be statistically defendable. They were meant to reach out to people who had already shown they were paying attention to existing or proposed pipelines for a variety of reasons. Our main goal of the survey was to see if the answers

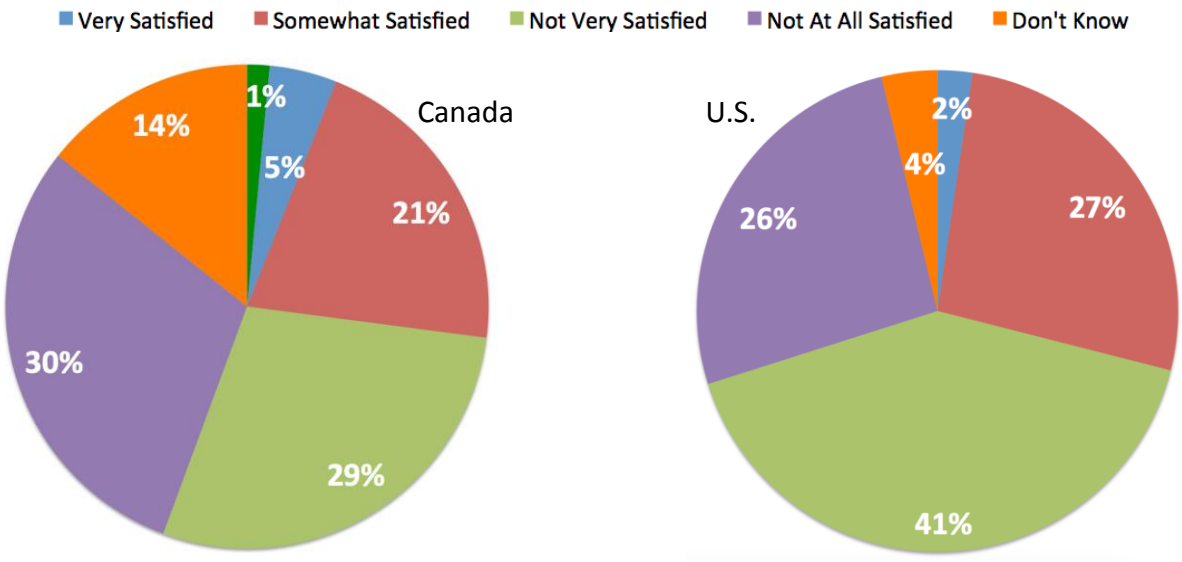
confirmed our existing beliefs in what information and indicators the concerned public had an interest in, or if there were areas we had not considered.

On a very basic issue the people surveyed on both sides of the border agreed consistently about the importance of access to pipeline safety information, with over 83% of people saying such access was very or extremely important. When asked how satisfied they were regarding existing kinds of information available around 60% of respondents in both countries were not very or not at all satisfied with information availability. The pie charts below show the particulars.

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



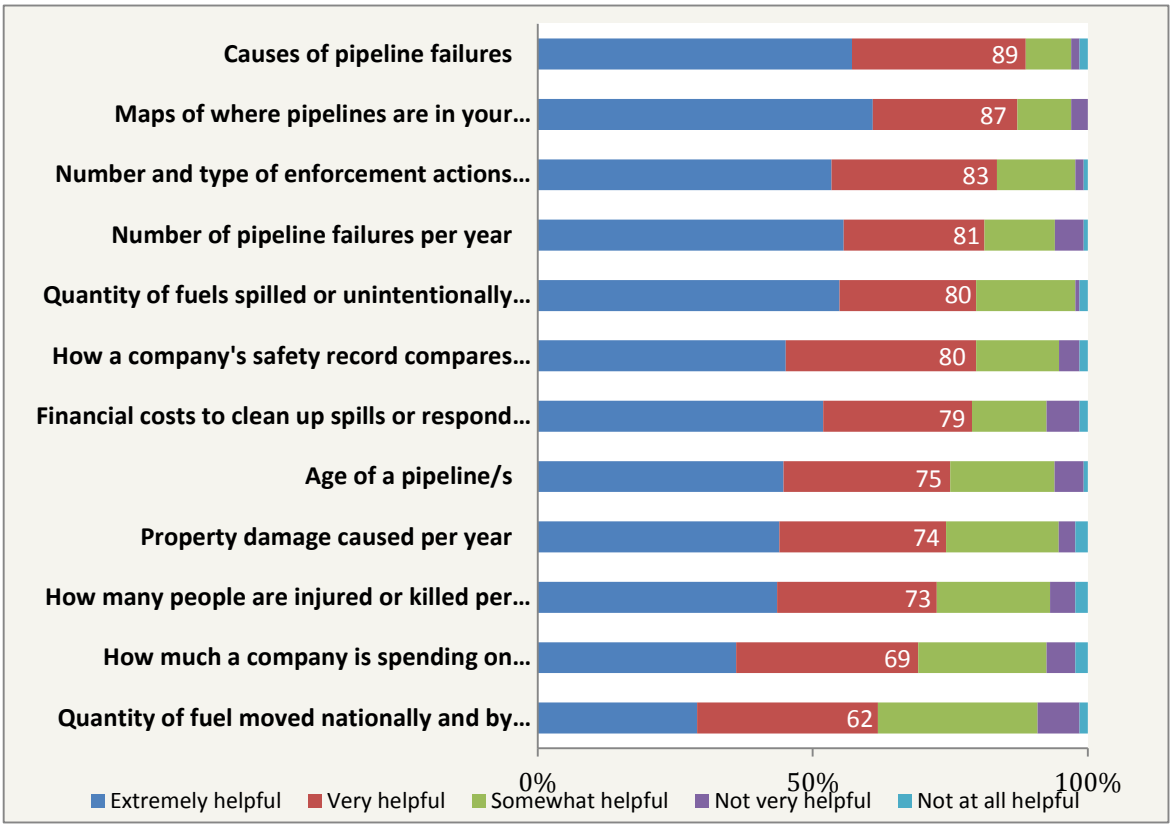
Overall how satisfied are you with the kinds of information you can currently easily access regarding pipeline safety?



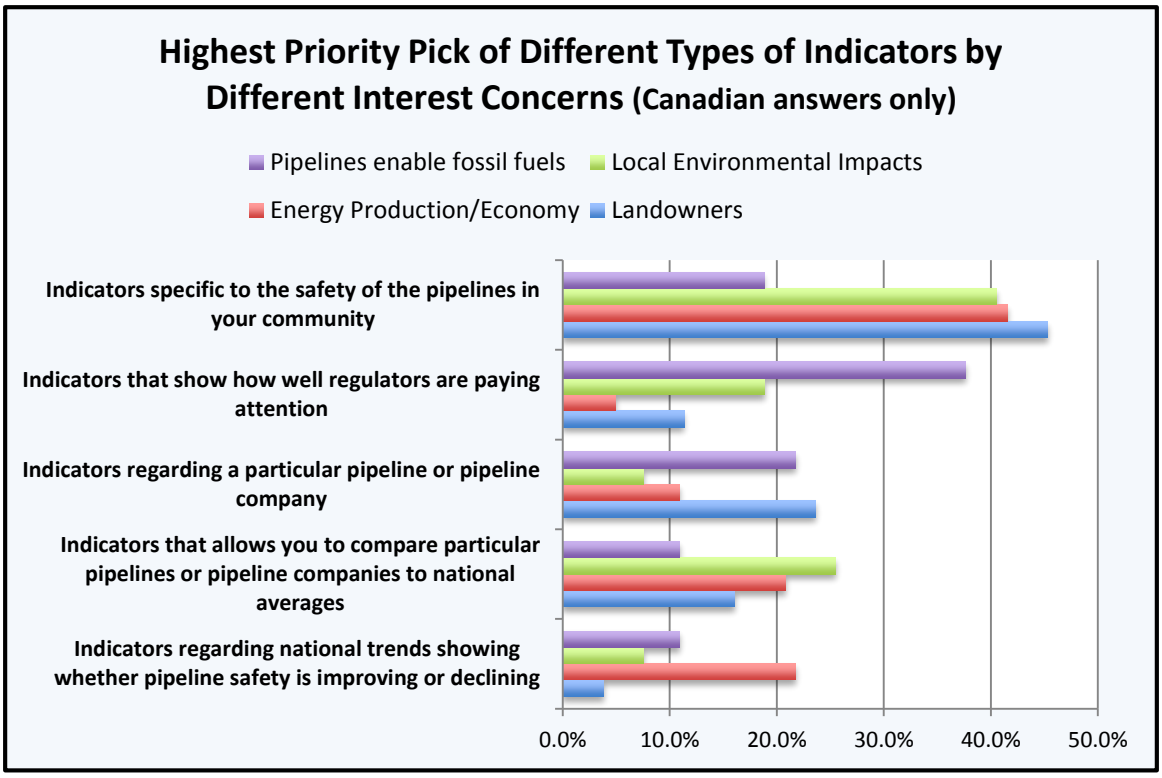
We asked people to self-select why they are interested in pipeline safety. The answers are shown in the table below. The concern about pipelines enabling greater use of fossil fuels was the most selected descriptor in both countries.

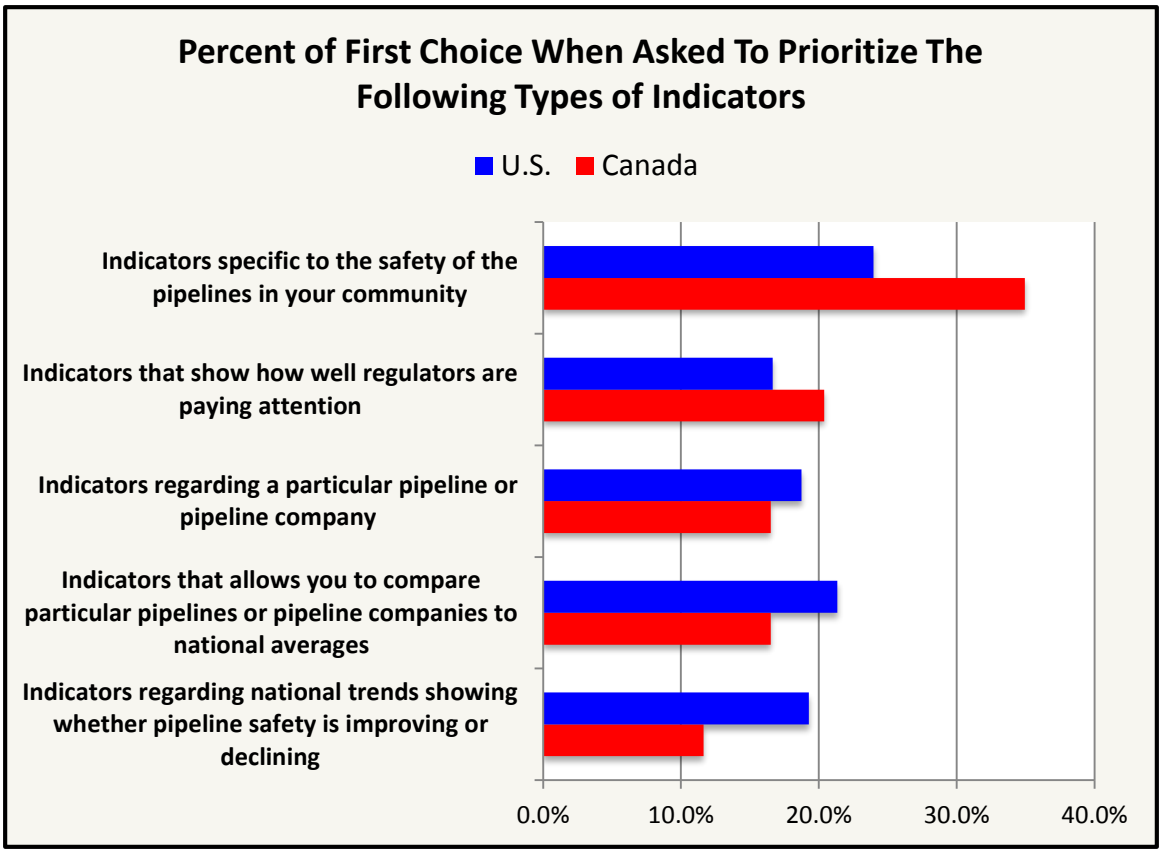
Table 1. Which one of the following best describes why you are interested in pipeline safety?		
	Canada	U.S.
I have concerns that pipelines enable greater production of fossil fuels, and that such production can have serious impacts on our health, waters or climate	28%	23%
I have concerns about the fuels pipelines carry and the potential effects on the public and environment should they be released	22%	17%
I am a landowner with a pipeline on my land, or proposed to be on my land	19%	9%
I think greater pipeline safety is key to being able to expand energy production, which is important to the economy in Canada	14%	2%
There is a new pipeline proposed nearby, and many concerns have been raised	5%	19%
I live or work very near a pipeline	5%	8%
I work for a local government that needs to ensure the safety of our citizens	1%	5%
I am concerned about effects pipelines may have on First Nations rights and cultural heritage	1%	2%
Other	5%	15%

When asked how helpful a variety of potential information might be to better understanding pipeline safety in both countries the number one answer was “causes of pipeline failures” and the number two answer was “maps of where pipelines are in your community.” Overall, people in both countries rated all information categories provided as helpful, and we received some direct emails from people quite annoyed that we were even asking them to rate and prioritize such things since “of course this is all very important and it should all be provided.” Below are the Canadian ratings of the categories.

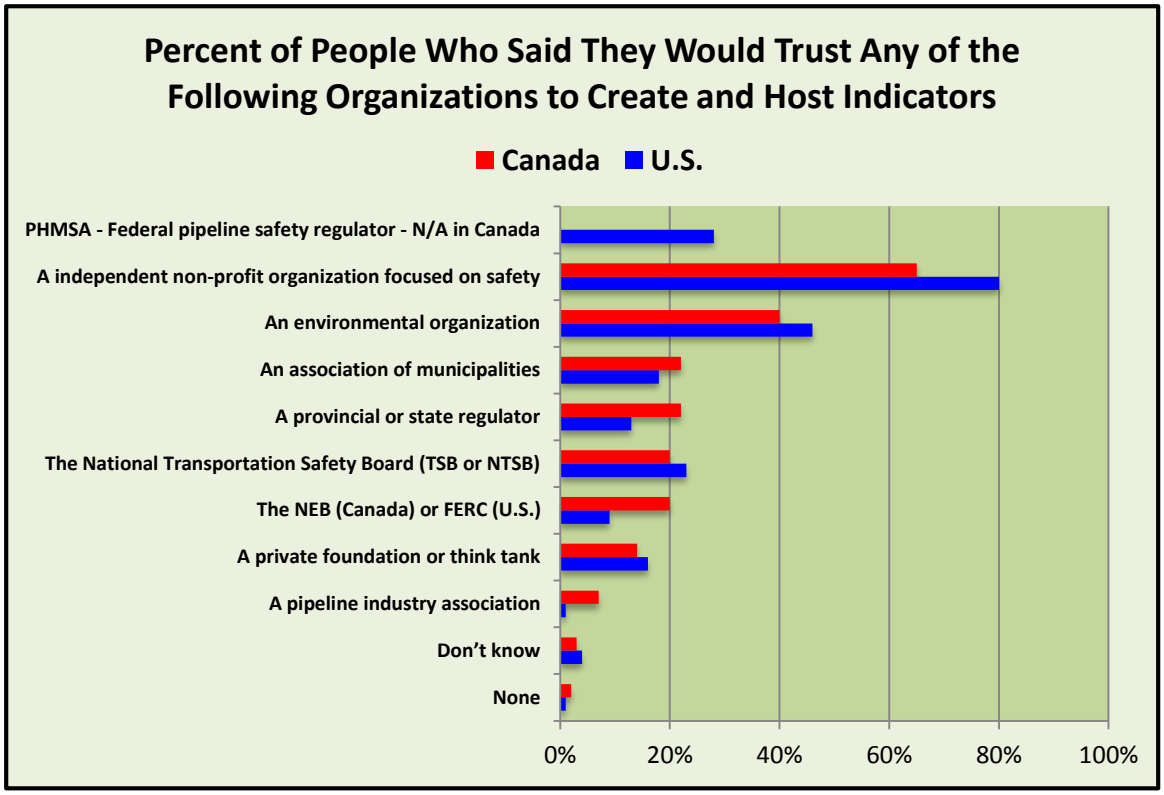


There was some difference in answers and ratings between people who identified their interest in pipeline safety for differing reasons. There were also some differences in indicator choices between Canadian and U.S. respondents. Below are some charts that provide some insights into this.





Finally, we asked who respondents would trust to create, update and host such pipeline safety indicators. Below are the answers from both surveys. Respondents could choose more than one. In the U.S. there is a separate pipeline safety regulator and pipeline rate/route setting regulator, which is why there was an additional choice on the U.S. survey.



Proposed Indicators

Proposed Indicators

- **Causes of Failures Over Time**
- **Number of Failures by Commodity**
- **Failures That Impact People or the Environment**
- **Quantities of Unintentionally Released Products**
- **Monetary Impacts of Failures**
- **Near Misses That Could Indicate Problems**
- **Quantity of Product Transported**
- **Indicators for Individual Companies**
- **Indicators That Provide Local Information**

Below are a handful of high-level indicators that we suggest together will provide a good sense of the safety of pipelines in Canada. While many of these same types of indicators are already used, we have in many cases redefined the reporting thresholds and definitions to more closely align with what we have found the concerned public believes. As is often said for such things, the devil is in the details, so we have tried to define those details for each proposed indicator. We have tried when possible to use real data in the examples of the proposed indicators, but in some cases that real data does not exist so we extrapolated as best we could from existing data, or in a couple of cases just made data up. So, the examples of indicators included are for illustration only, and should not be relied on as indicating anything accurately at this point.

We have broken the indicators into three categories. The first category is indicators that lend themselves to being able to show safety trends over time, so people can see if safety is improving or declining both industry-wide and for specific companies. The second category includes indicators that

help people in specific locations assess for themselves the relative risk of the pipelines in their own community. The third category is indicators that help show the effectiveness of regulatory efforts.

It needs to be understood that no one category alone provides a very clear picture of the safety of these pipeline systems. For example, if one just looked at the number of pipeline failures over time one could come to the conclusion that safety is declining because the number of failures is increasing. That single-point analysis could miss a greater emphasis on safety in highly populated or environmentally sensitive areas that may be driving down actual impacts to people and the environment. So while the number of failures may be increasing, the actual volume of substances released or the impacts on the environment could be decreasing.

Finally we want to state clearly that we think indicators are only a starting point, and as such need to be fully backed up by the actual data so people can rearrange, manipulate, zoom in, and examine what the indicator means from their own perspective and for their own specific purpose. Playing with data is a great way to get deeper insight into safety issues. Indicators can be provided in many different graphical representations, and different people prefer and learn from different styles of representations. For many, a handful of static indicators may be as deep as they get into understanding pipeline safety so we have tried to design these indicators with that in mind, but we feel strongly that ultimately these indicators should be provided in ways that allow people to visualize them in different ways.

Indicators That Show Safety Trends

Causes of Failures Over Time

This indicator would show the major causes for pipeline failures averaged over the past 20 years, 10 years and 3 years.

Goal of Indicator – To provide clear information about the major cause categories of pipeline failures, and whether the number of failures from those causes is increasing or decreasing over time.

Rationale – Causes of pipeline failures was one of the highest priority indicators in both our surveys. A clear indicator showing failure causes over time helps the public better understand where the risks from failures originate, and whether those failure causes are increasing or decreasing. It also helps focus efforts by the industry and the regulators to priority areas of concern.

Key Definitions:

Natural Force Damage – Causes such as landslides, floods, lightening, etc.

Other Outside Force Damage – Causes such as electrical arcing, vehicles driving into pipelines, intentional damage, failures caused by fires or explosions.

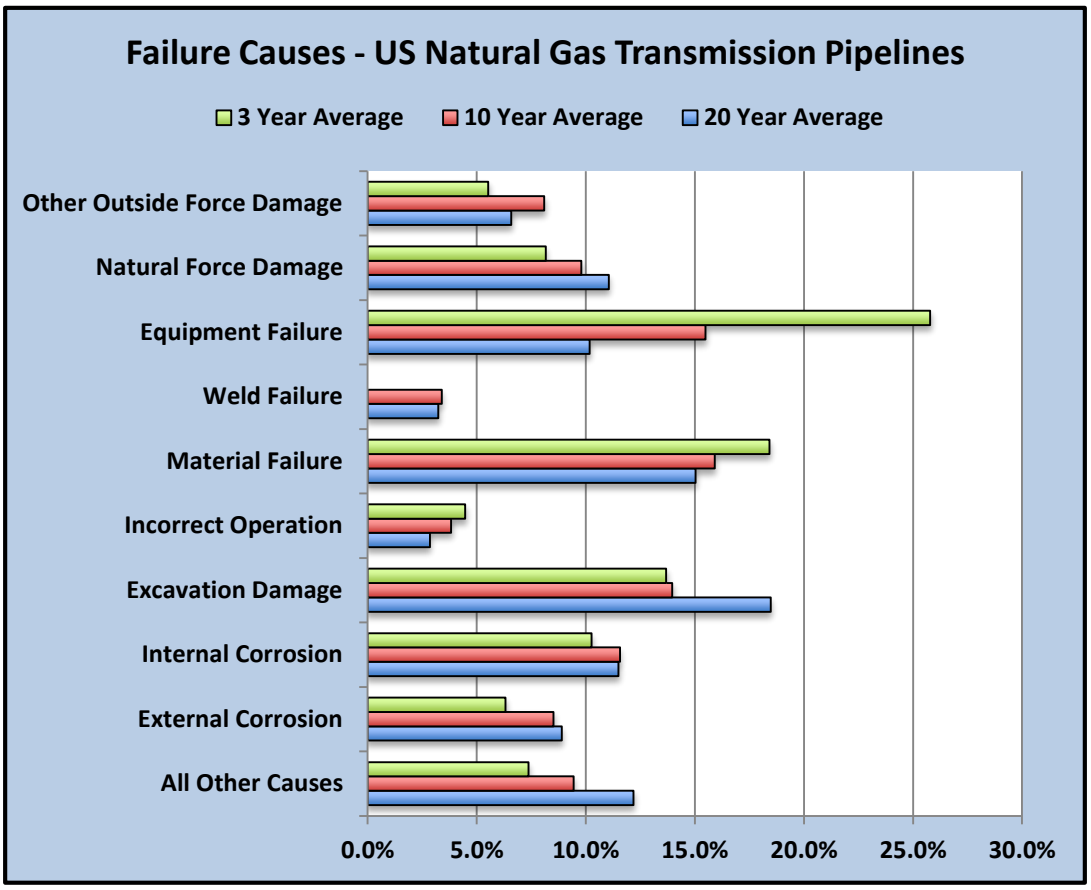
Excavation Damage – Hitting the pipeline while excavating by the operator, contractor, or a third party.

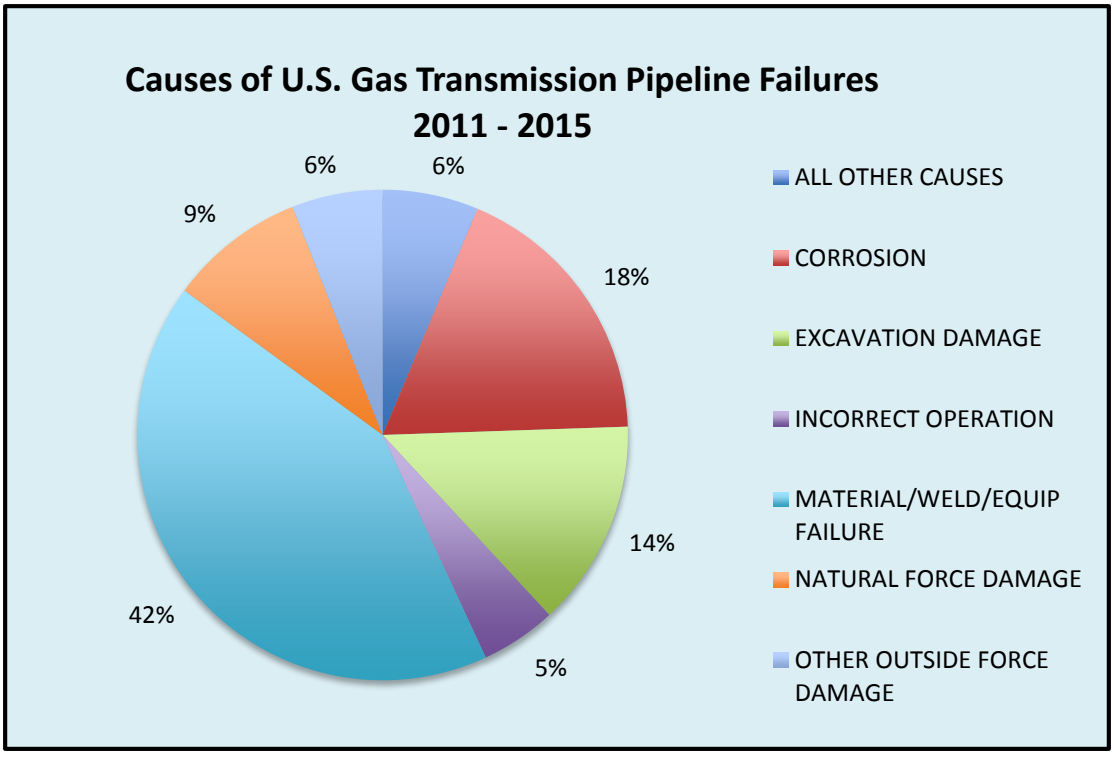
Incorrect Operation – Causes such as incorrect installations, over pressurizations, incorrect valve position, etc.

Needed Data: Failures each year by cause categories

Identified Data Barriers : Different regulators define causes differently, or do not currently collect this level of detail. Training operators to report failures in the correct categories. Often failures have more than a single simple cause – how to capture events caused by multiple problems.

Example (real data):





Overall Failures – Releases – Failures/Kilometer/Year

This indicator would include all releases of harmful substances broken out by broad commodity categories and normalized per kilometer of pipe. Often these types of releases are termed as "incidents" or "accidents," but we chose the word "Failures", because clearly to the public a pipeline that inadvertently releases the product it is meant to carry amounts to a failure. We have chosen reporting thresholds that are much lower than what many regulatory agencies now use, but that also align better with the public's view of what is harmful.

Goal of Indicator – To provide a clear normalized measure of whether the number of failures on pipelines carrying various commodities is increasing or decreasing.

Rationale – Pipeline safety is all about keeping the product in the pipe, so this is a prime indicator of how well safety is being achieved. Industry groups and regulators alike have committed to a goal of "zero incidents," so this is the key indicator of how well they are doing over time. Breaking out commodity types is important so it is possible to see if certain commodities are having higher failure rates than others, and normalizing the number of failures per kilometer of pipe helps ensure apple to apple comparisons over time as the mileage of pipelines increase or decrease.

Key Definitions

Release – an unplanned discharge from a pipeline system, including not only the line pipe but also all associated equipment such as valves, pump and compressor stations, pig launchers, etc.

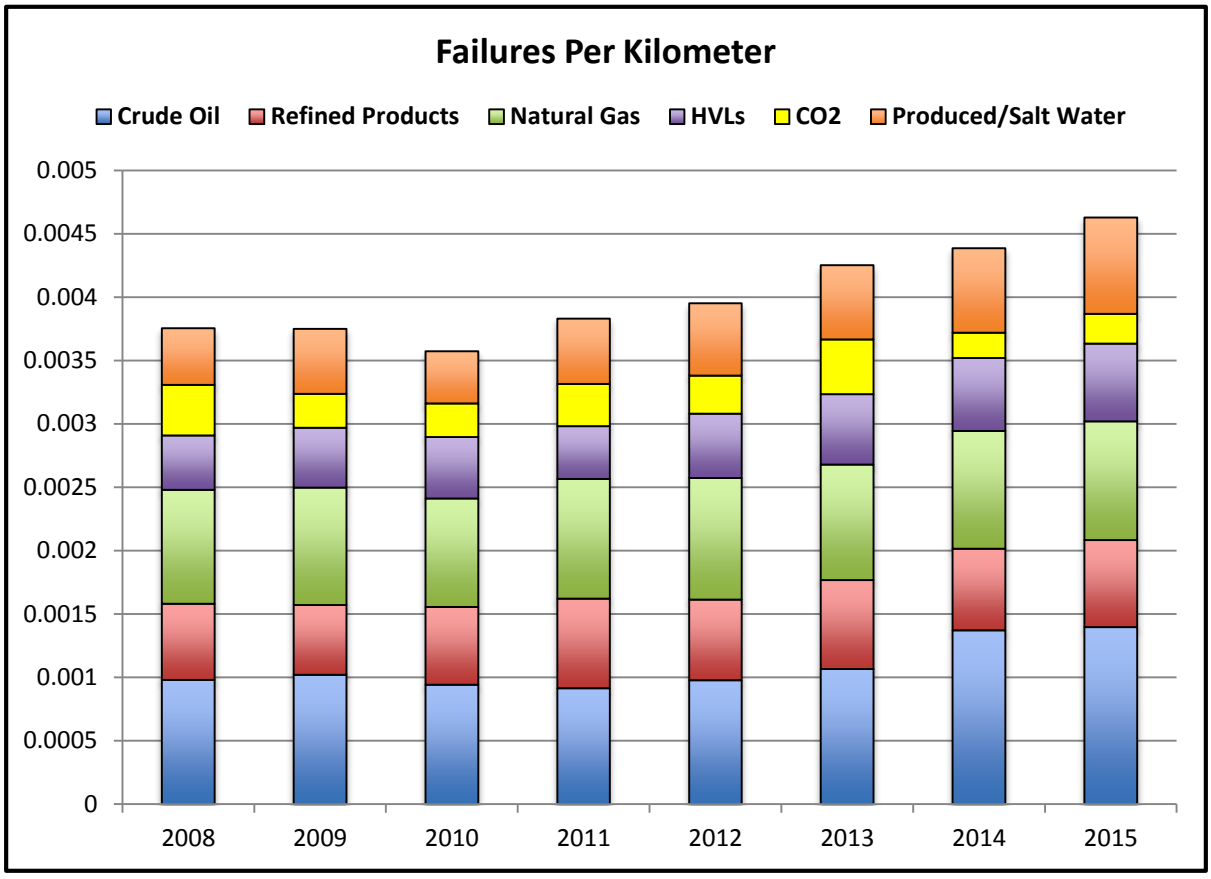
Harmful Substance – to include at a minimum crude oil (including diluted bitumen), petroleum products (LVPs such as gasoline, jet fuel, diesel, etc.), all forms of natural gas, high vapor pressure hydrocarbons (such propane, butane, ethane, etc.), produced water/salt water, anhydrous ammonia, CO2

Reporting threshold – any release of 20 liters or more

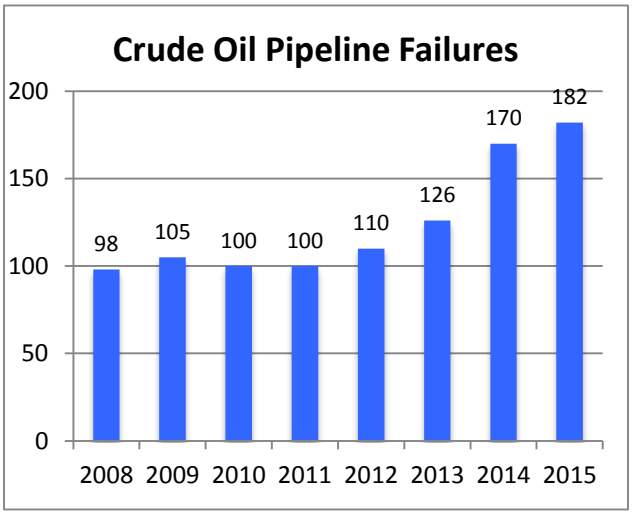
Needed Data – Number of annual releases by year, broken out by substance, at or above the reporting threshold. Pipeline length in kilometers each year for substances carried.

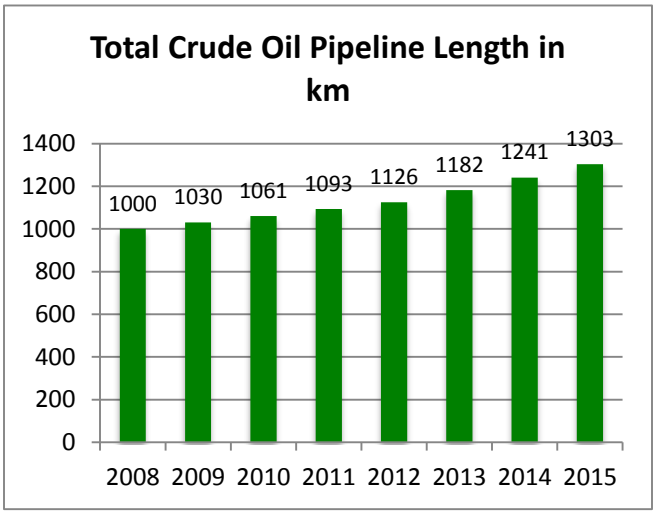
Identified Data Barriers/Concerns – Historical release data at the proposed threshold may not be available. Pipeline length in kilometers by substance may not be available. Some pipelines carry multiple substances, so failures/kilometer for individual substances may be difficult. Upstream pipelines carry and release a larger variety of substances, so some consensus needs to be made regarding what substances to include in combined high-level indicators. Many upstream pipelines are of a much smaller diameter so how legitimate is it to treat a 88.9mm diameter pipeline failure the same as a 914.4mm diameter pipeline failure?

Example (fictional data):



Other benefits – From data needed for the Overall Failures indicator other indicators of interest such as number of specific commodity failures each year (below), failures per kilometer for specific commodities, or pipeline lengths (below) can be easily produced.





Failures That Impact People and the Environment – Failures/Kilometer/Year

This indicator would include all failures due to releases where deaths or significant injuries to people occur, or where evacuation is necessary. It would also include all failures due to releases that cause a fire, explosion, damage to private or public property, or harm to water, wildlife, soil, and the atmosphere.

Goal of Indicator – To provide a clear normalized indicator that displays the number of failures each year that impact people or the environment compared to the total number of failures.

Rationale: A better understanding of pipeline failures that impact people's actual wellbeing, have the potential to impact their wellbeing, or that impact the environment all rate as high priorities for the public. This subset of the Overall Failures will also allow people to better gauge the failures that impact the things they care about versus failures that may have little impact, or may be completely contained on pipeline company property.

Key Definitions:

Releases – same definition as for Overall Releases

Significant Injuries – We used a slightly edited NEB definition, which includes:

- the fracture of a major bone;
- the amputation of a body part;
- the loss of sight in one or both eyes;
- internal hemorrhage;
- third degree burns;
- unconsciousness; or
- any other injury that requires in-patient hospitalization.

Damage to private or public property – Any monetary damage to property not owned by the pipeline company (not including the value of product being transported).

Harm to water or wildlife (mammals, fish, birds, amphibians, reptiles) – Any direct contact by liquids to wildlife, or surface or groundwater, or potential indirect impacts

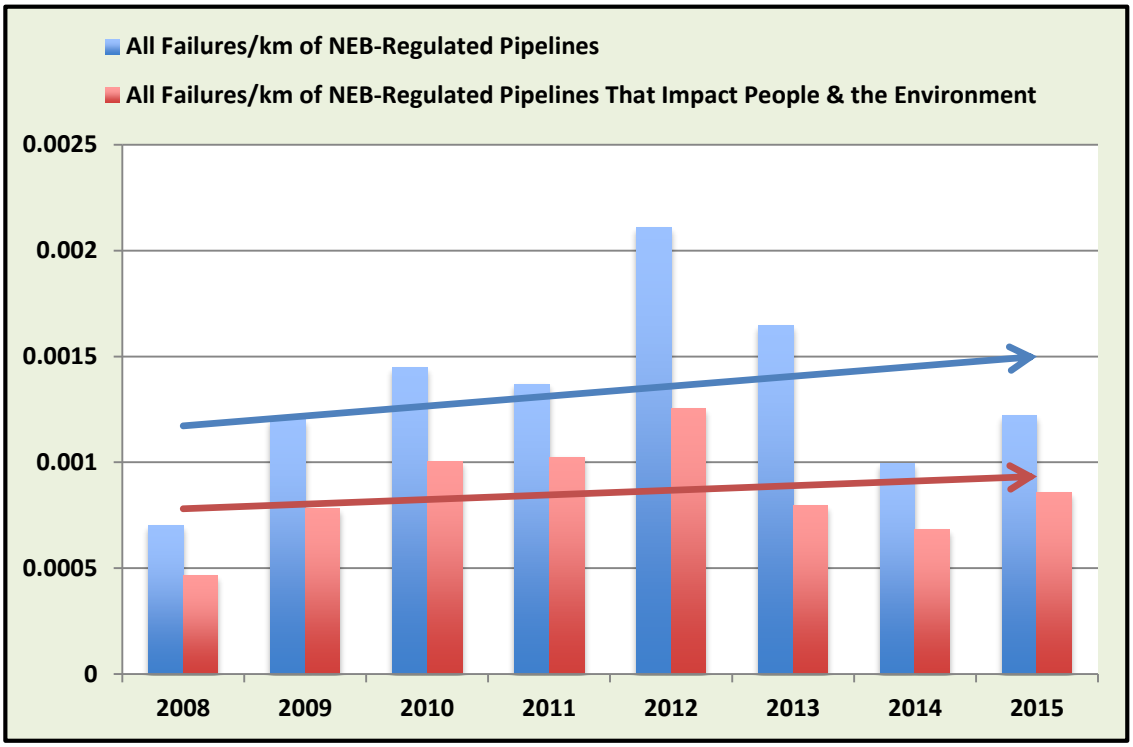
Harm to soil – Any release of harmful liquids that are off pipeline company property.

Harm to atmosphere – Any release of natural gas

Needed Data: Number of annual releases by year, broken out by substance released. Identification of whether releases were off, or migrated off, company property. Identification of any monetary damage to property not owned by the pipeline company. Identification of failures that impact people or the environment as defined above. Pipeline length in kilometers each year for substances carried.

Identified Data Barriers : Different regulators define "injuries" differently so historical data may not be available. Historical release data at the proposed threshold may not be available. Pipeline length in kilometers by substance may not be available. Property damage data not collected by all regulators. Historical data on harm to water and wildlife may not be available. Currently the NEB includes in their definition of a reportable incident workplace deaths and injuries that are not caused by a pipeline release. Separating these workplace injuries from ones caused by actual pipeline failures needs to occur.

Example (real data):



Quantities of Unintentionally Released Products

This indicator would provide an easy reference for the quantities of harmful substances carried by pipelines that get unintentionally released each year. The indicator could be shown as yearly spill volumes for each product, or a rate of volume/incident/year.

Goal of Indicator – To show the volume of various commodities released during failures each year, and whether those volumes are increasing or decreasing.

Rationale – Since products are supposed to stay in the pipe, the quantity of harmful substances that are unintentionally released when pipelines fail is an important indicator not only of pipeline safety, but also of how quickly pipeline companies can shut down pipelines and contain releases when failures occur.

Key Definitions:

Releases – same definition as for Overall Releases

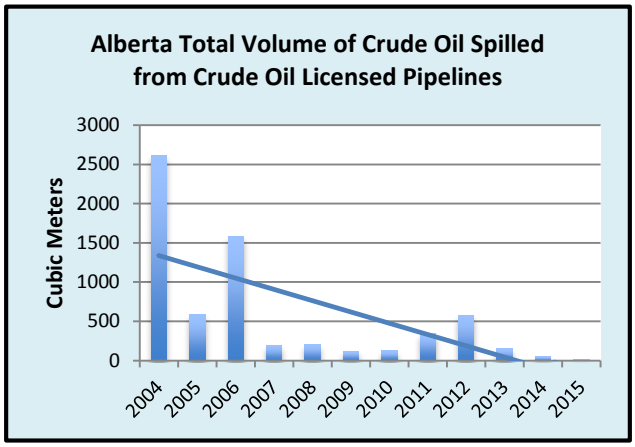
Major harmful substances to track separately – to include at a minimum crude oil (including diluted bitumen), petroleum products (LVPs such as gasoline, jet fuel, diesel, etc.), all forms of natural gas, high vapor pressure hydrocarbons (such propane, butane, ethane, etc.), produced water/salt water, anhydrous ammonia, CO2

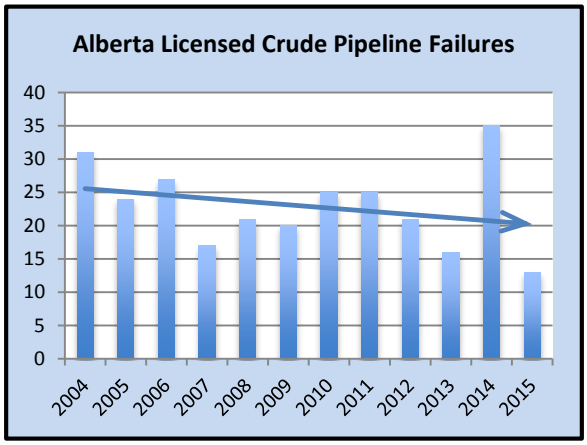
Needed Data: Number of failures each year. Volume of harmful substance type released in each failure.

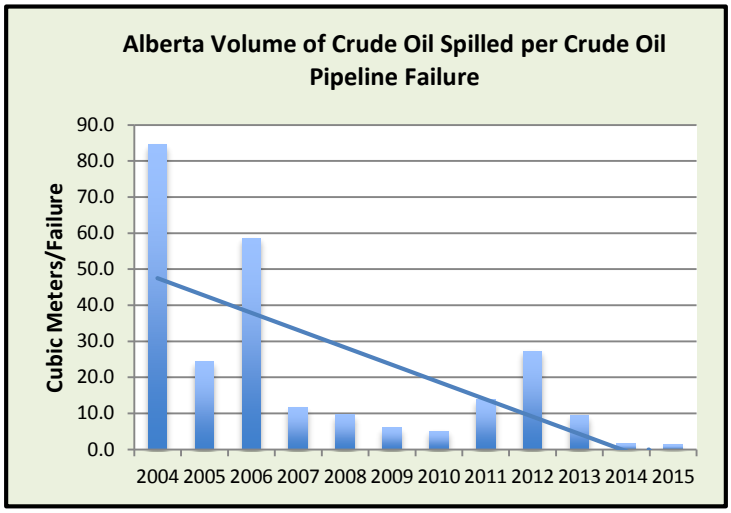
Identified Data Barriers : Historical release data at the proposed threshold may not be available. Some regulators include other substances in release definitions and data, such as water used for

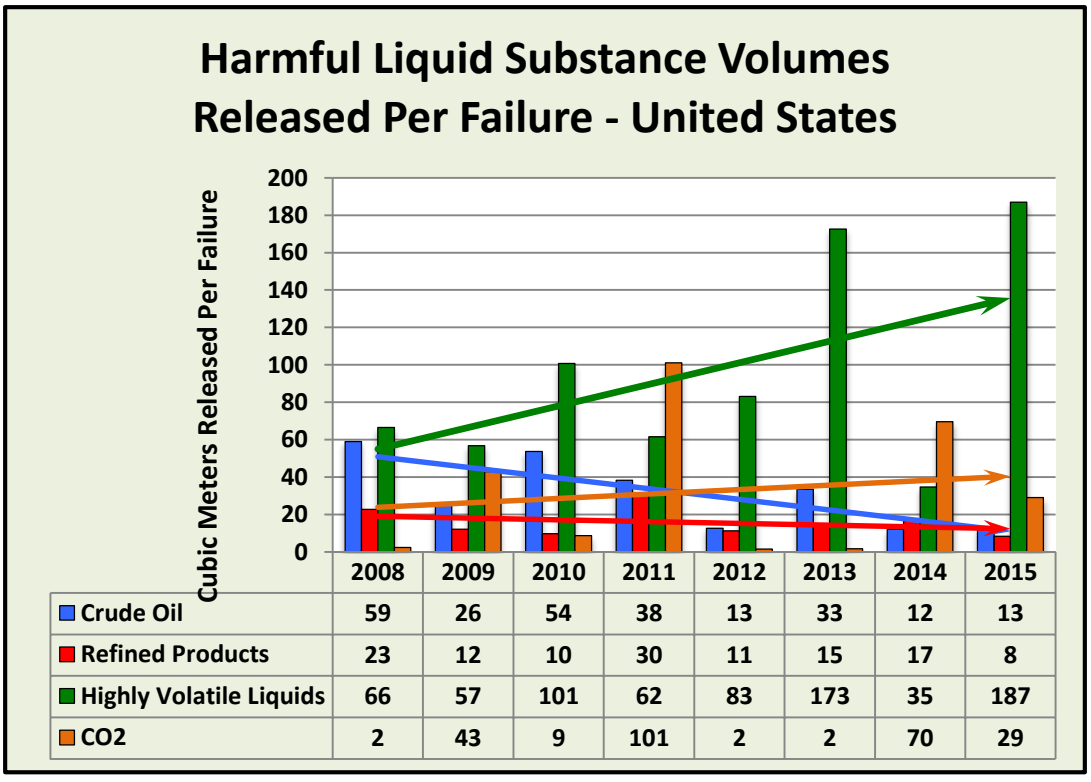
hydrostatic pressure testing or drilling mud, which may complicate data accuracy. Accuracy of volumes provided by pipeline companies.

Examples (real data):









	2008	2009	2010	2011	2012	2013	2014	2015
Crude Oil	59	26	54	38	13	33	12	13
Refined Products	23	12	10	30	11	15	17	8
Highly Volatile Liquids	66	57	101	62	83	173	35	187
CO2	2	43	9	101	2	2	70	29

Monetary Impacts from Releases

This would be an indicator that would show the direct monetary costs of pipeline failures.

Goal of Indicator – To show the various monetary costs of pipeline failures

Rationale – While pipelines move vast quantities of products relatively safely across the country, when failures occur the costs of those failures are disproportionally assessed to citizens in the locality of the failure. This indicator would help people understand those costs, and see whether they are increasing or decreasing.

Key Definitions –

Private & Public Property Damage – The cost to restore damaged private or publicly owned property back to its pre-failure state, along with the loss of use costs for property that can not be used during the clean up and restoration period.

Pipeline Company Property Damage – The cost to restore damaged pipeline owned property back to its pre-failure state, including the pipeline itself, along with the value of the lost product.

Emergency Response Costs – The cost to the public for governmental agencies (law enforcement, fire, health, public works, environmental, etc.) to respond to pipeline failures, including pipeline safety regulators.

Restoration and Clean Up Costs – The cost to remove harmful substances and restore water quality, soil quality, and natural habitat back to its pre-failure state

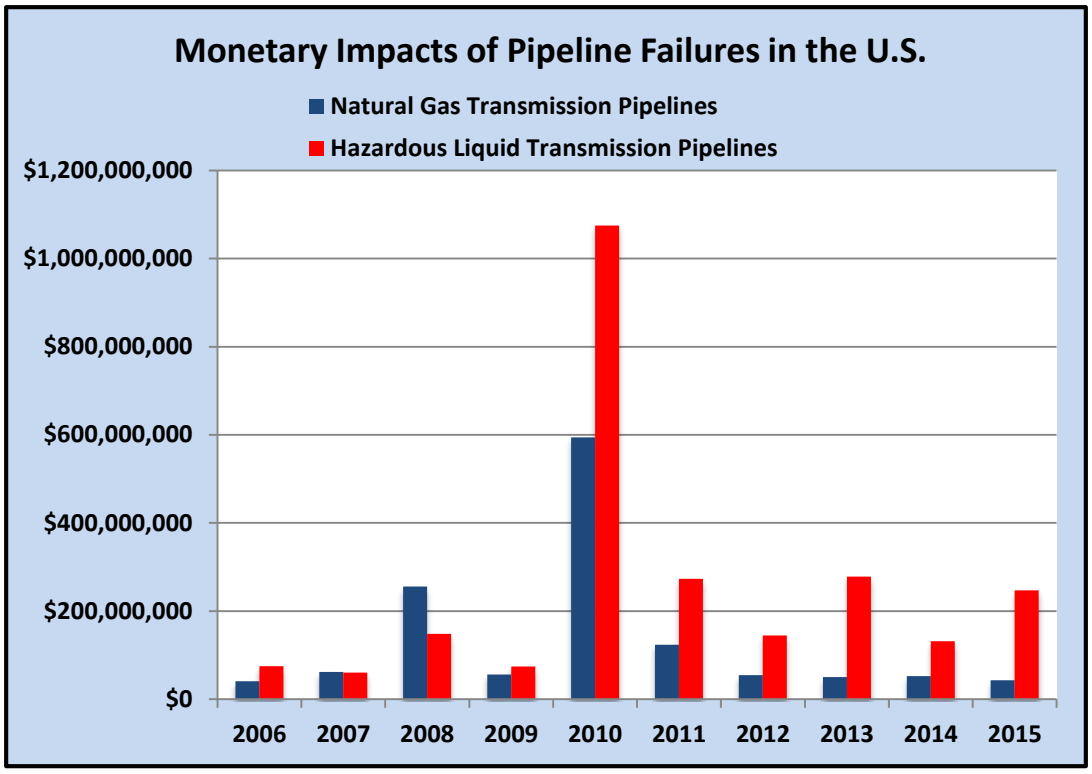
Medical Expenses – The cost of any short or long term medical expenses associated with a pipeline failure.

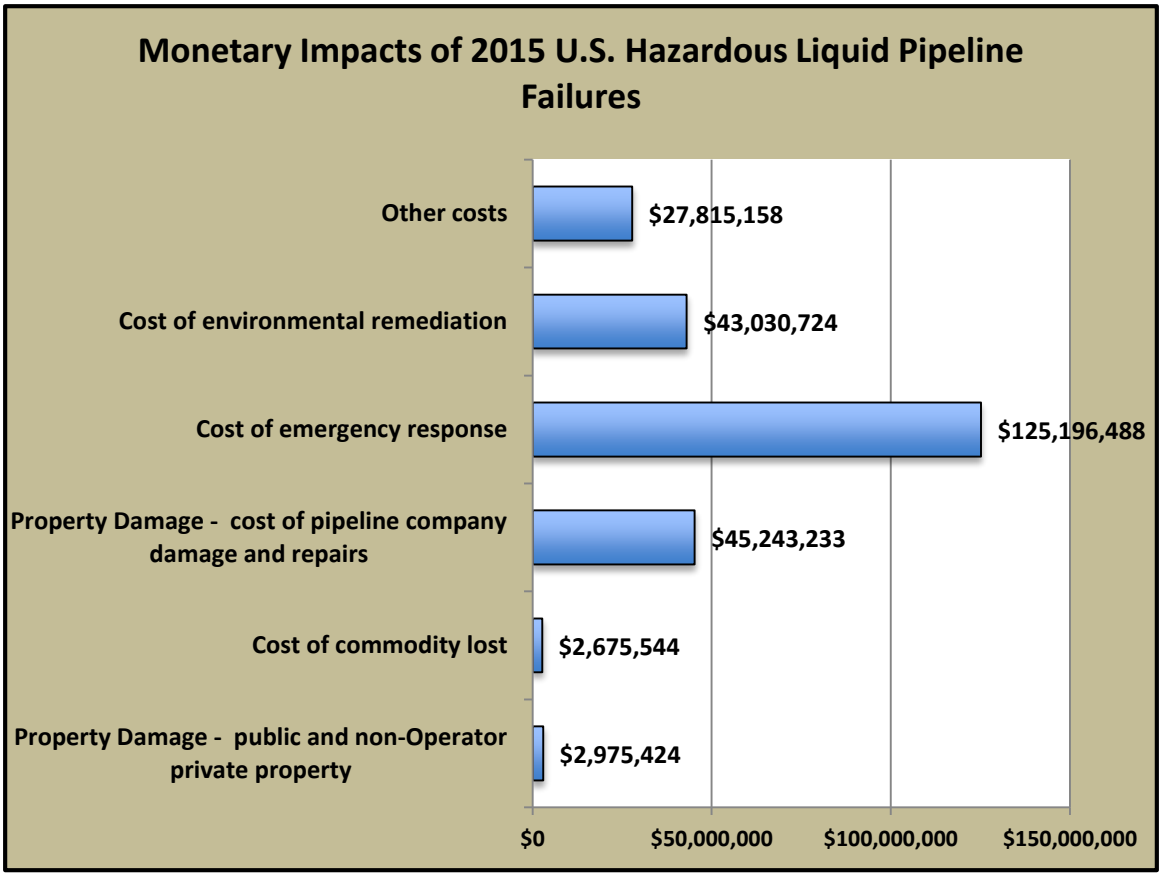
Legal costs – the legal costs to private parties, government, and the industry to settle claims associated with a failure, along with the value of the claims themselves if not covered in another monetary impact category.

Needed Data: The monetary cost for each category above for each pipeline failure

Identified Data Barriers: In Canada little of this type of monetary costs are required to be reported so historical data will be very difficult to obtain. For a variety of reasons costs change over time, are different in different locations, and are difficult to report accurately and consistently, so using such an indicator to view trends over time is difficult. It is possible to account for inflation, but other factors affecting costs are nearly impossible. There may also be privacy or legal reasons why some of these costs, such as legal and medical, may not be available.

Example (real data):





Near Misses That Could Indicate Problems or Potential Future Failures (Unauthorized Excavation, Over Pressure Events, Excess Land Movement, Corrosion Beyond Allowable Limits)

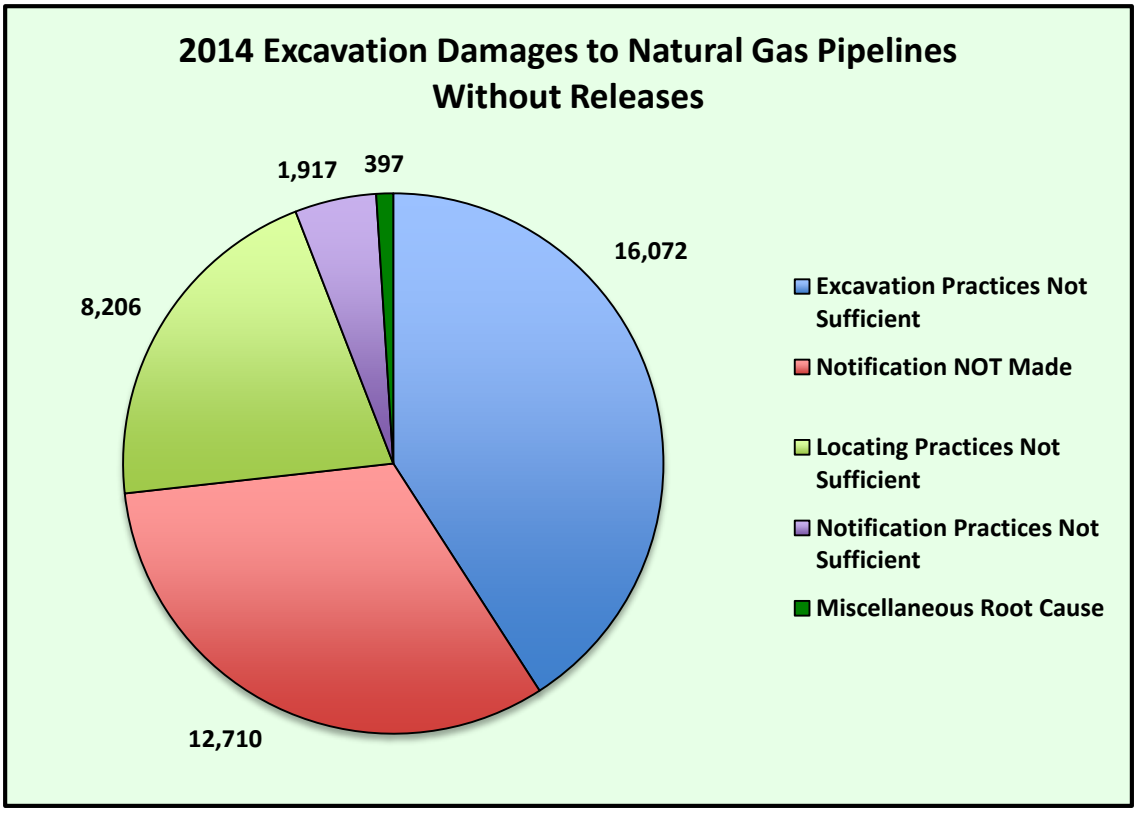
Goal of Indicator – Provide indicators of whether a variety of events that could foretell future failures are increasing or decreasing.

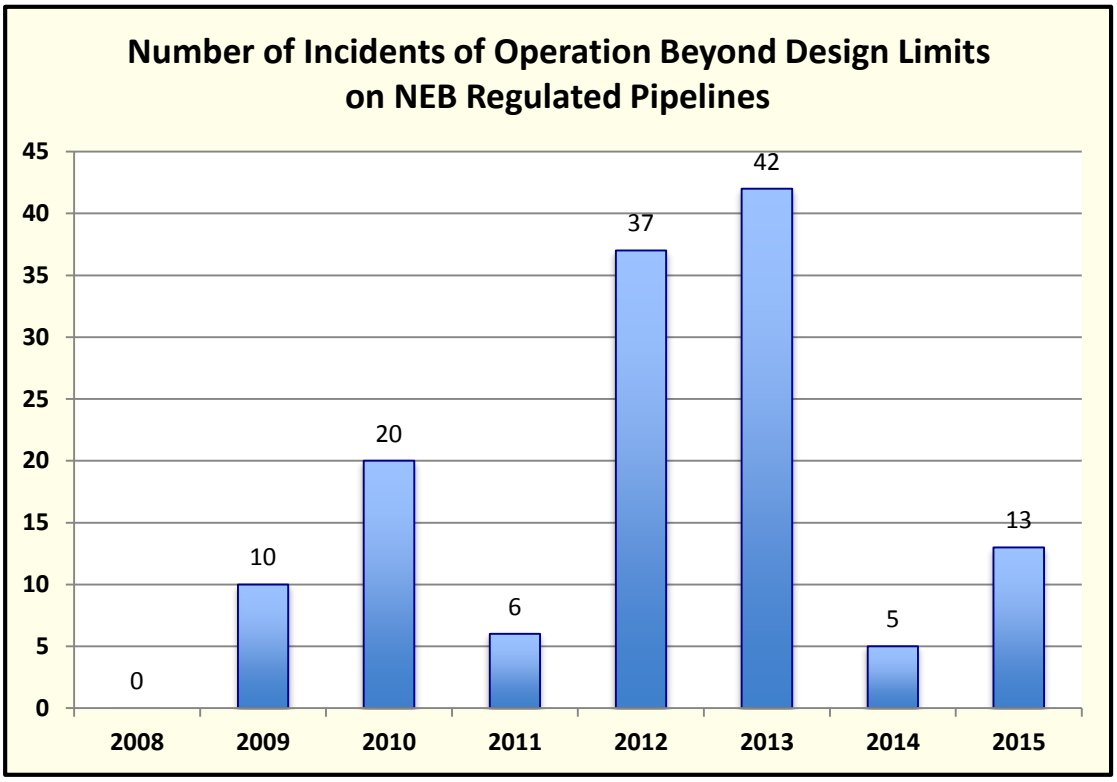
Rationale – Certain events such as over pressurizing the pipeline, excess land movement, or excavation damage along the pipeline right of way can point to near misses that stress the pipeline requiring ongoing monitoring or changes in design standards used. Other events such as discovery of corrosion beyond allowable limits indicate that inspection and monitoring systems may not be adequate. Such forward-looking indicators would help operators identify areas in need of greater scrutiny, and if the frequency of such events is tracked over time can give the public another measure of whether safety is improving or declining before failures occur.

Key Definitions –
We have not tried to come up with a comprehensive list of potential "Near Miss" situations that should be tracked. This is an effort better left to regulators and engineers to come up with a short list of issues to track and report on. The NEB has already started reporting requirements for such forward-looking near misses, and the most recent report of those can be found here.

Needed Data: To be determined

Example (real data):





Quantities of Product Transported

This indicator would provide volumes of the main categories of products transported by pipelines each year.

Goal of Indicator – Provide a clear measure of whether the quantity of the major products transported by pipelines is increasing or decreasing.

Rationale – In our surveys people, particularly those concerned with the global effects of fossil fuel use, were interested in an indicator that would provide a high level measure of whether as a society we were making progress reducing our use of fossil fuels. Since pipelines transport the vast majority of these products, by taking a look at the total annual volume of different products being transported by pipelines one can get a sense of whether we are truly transitioning to new energy sources or not.

Key Definitions –

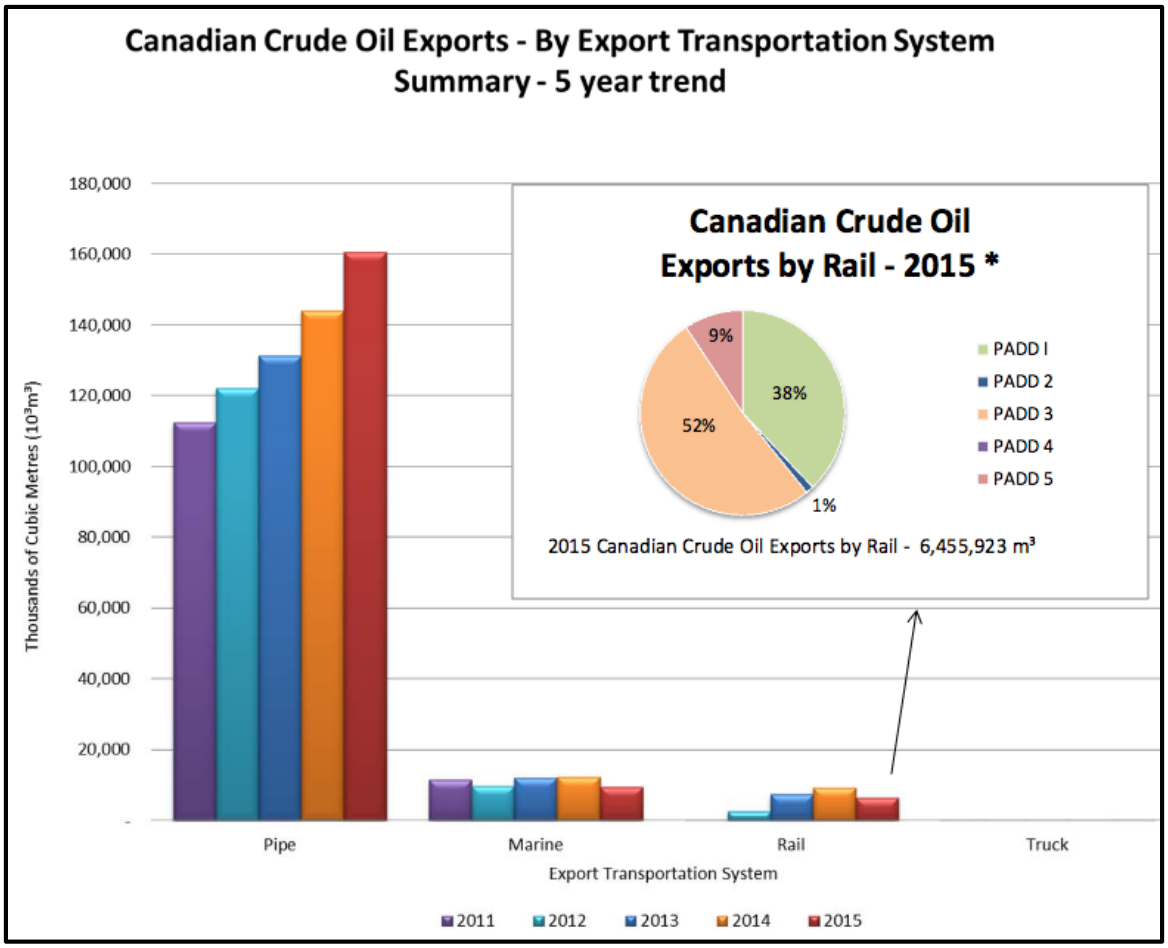
Products to be measured – we would suggest crude oils, natural gas, and natural gas liquids (propane, butane, ethane).

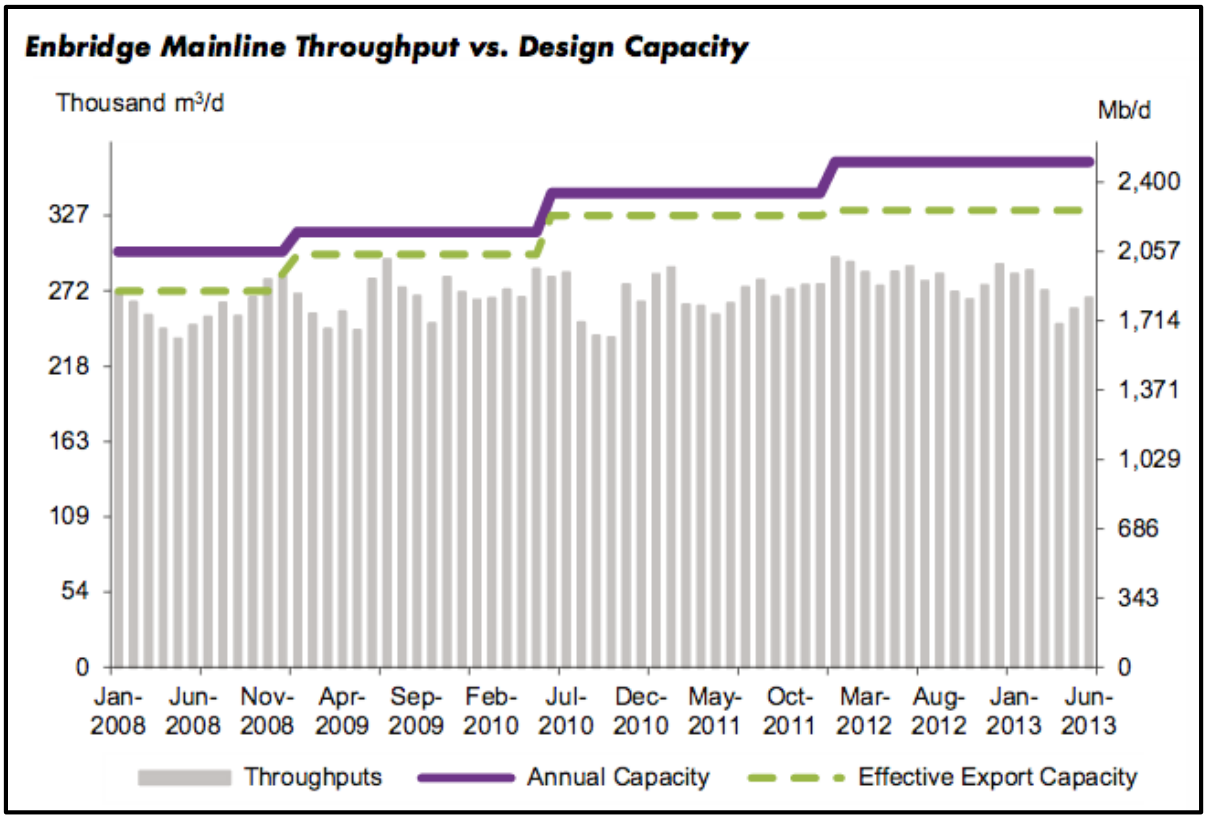
Measurement unit –
For liquids - thousands of cubic meters
For natural gas millions of cubic meters

Needed Data: The volume of each product transported per year. We believe the NEB and others already collect this data, so obtaining data should not be an issue.

Identified Data Barriers: We believe that the NEB collects and makes most of this data readily available. A good deal of it can be found on the NEB's Energy Information webpage. Of particular value is the NEB's Canadian Pipeline Transportation System - Energy Market Assessment.

Example (real data):



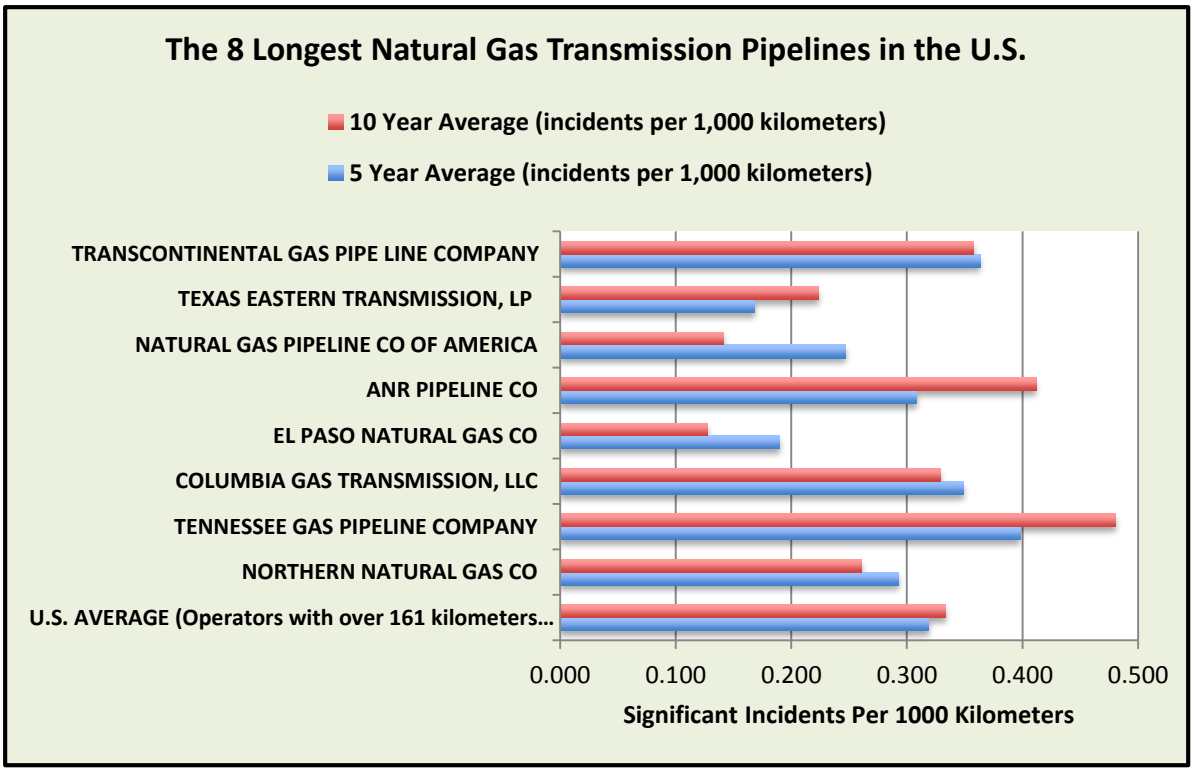


All the above for Individual Companies

Goal of Indicator – Provide all of the above indicators for individual companies so performance can be compared.

One thing that was clear from the surveys that is often missed by people who focus on larger pipeline safety issues is that people are more interested in specifics about the pipelines in their communities than in broader national trends that show how the industry as a whole is performing. This "what's in my backyard" (WIMBY) attitude makes sense since most people really don't want to get deeply into pipeline safety issues, they just want to know that their families and communities are safe. For that reason people really want specific information about the pipelines that run through their community, so providing the same types of indicators talked about above for individual pipelines is necessary. This can be challenging because often failures on specific pipelines are so infrequent that meaningful indicators are difficult to produce since even a single incident in a ten year period can skew comparative indicators.

Here are some examples, and this is talked about more in the next section that proposes indicators that provide local information.



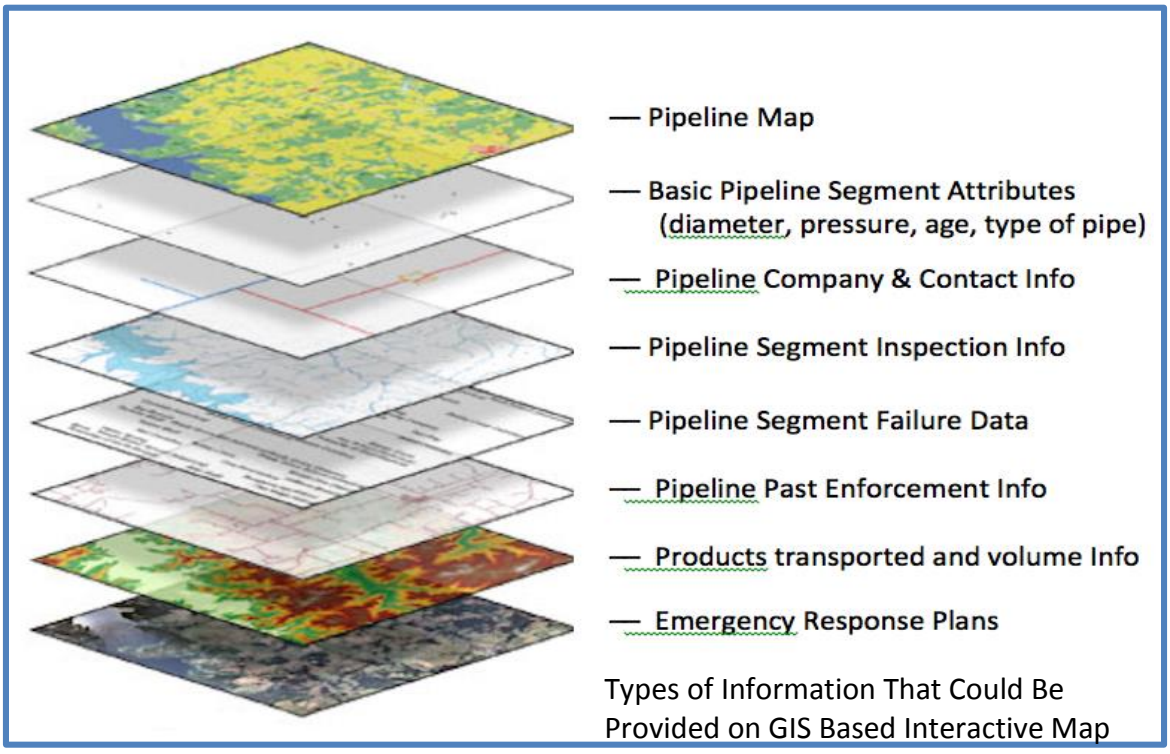
	10 Year Average (incidents per 1,000 kilometers)	5 Year Average (incidents per 1,000 kilometers)	10 Year Significant Incident Count	5 Year Significant Incident Count	2015 Kilometers
U.S. AVERAGE (Operators with over 161 kilometers of pipeline)	0.319	0.333	560	293	455,876
NORTHERN NATURAL GAS CO	0.293	0.261	27	12	23,783
TENNESSEE GAS PIPELINE COMPANY	0.398	0.481	30	18	18,958
COLUMBIA GAS TRANSMISSION, LLC	0.349	0.330	24	11	16,855
EL PASO NATURAL GAS CO	0.190	0.127	12	4	16,305
ANR PIPELINE CO	0.308	0.412	18	12	15,041
NATURAL GAS PIPELINE CO OF AMERICA	0.247	0.141	14	4	14,672
TEXAS EASTERN TRANSMISSION, LP	0.168	0.224	9	6	13,970
TRANSCONTINENTAL GAS PIPE LINE COMPANY	0.363	0.357	19	9	13,095

Indicators That Provide Local Information

Goal of Indicator – Provide desired information specific to the pipelines where people live and work.

As mentioned above the highest desired indicators, from both surveys, was for information specific to pipelines in the communities where people live. The second most desired piece of information, after the cause of pipeline failures, was for maps of pipelines. This is a request we have heard from the public over and over again for years, and is one of the major missing pieces in Canada. Maps, based on layers of GIS data, are also the most promising, effective, and simple way to address the whole range of information that people are interested in, and that if provided could help create greater understanding and build greater trust in real public engagement. With technology now easily available it is possible to build a public pipeline map system that would allow people anywhere in Canada with a computer or smart phone to see where pipelines are located near where they are, and by a simple click on the map or entering an address be given a whole range of information they may be interested in.

Below is an illustration that shows the types of information that people have said they are interested in and that could be provided through such a GIS based map system. The NEB has started down this path with their Interactive Incident Map, which allows people to click on an incident represented by a dot on a map and get information about that failure. CEPA has also started down this path with their About Pipelines Map, which provides an interactive map of their member companies pipelines, which a person can click on to get some very basic information about the pipeline (operator, age, product transported, regulator, active or not, and location of some facilities such as compressors and pump stations). In the U.S. a National Pipeline Mapping System has been developed that allows people to look at pipelines within individual counties and then click on the pipelines to learn some basic information (operator, product transported, company contact info, active or not). Some individual pipeline companies have also started to provide maps, which in some cases provide more information the public is interested in. For example, Marathon Pipe Line's System Map allows people to see where their pipelines run, and by clicking on the pipeline a person can get information about the products transported, diameter of the pipe, and typical operating pressure.



Types of Information That Could Be Provided on GIS Based Interactive Map

We understand that some have security concerns providing pipeline locations and other data of this type openly on the Internet. Most all of this information is already collected and available from a variety of sources, so if someone was intent on doing harm they could obtain this information. We are not privy to data that show actual threats to pipelines, but for the most part arguments against providing this type of information easily through a GIS map application seem to be made to avoid providing information, not to actually protect pipelines from terrorists. Such efforts to keep information secret make people wonder what the information says about the safety of our pipeline system, and undermine trust.

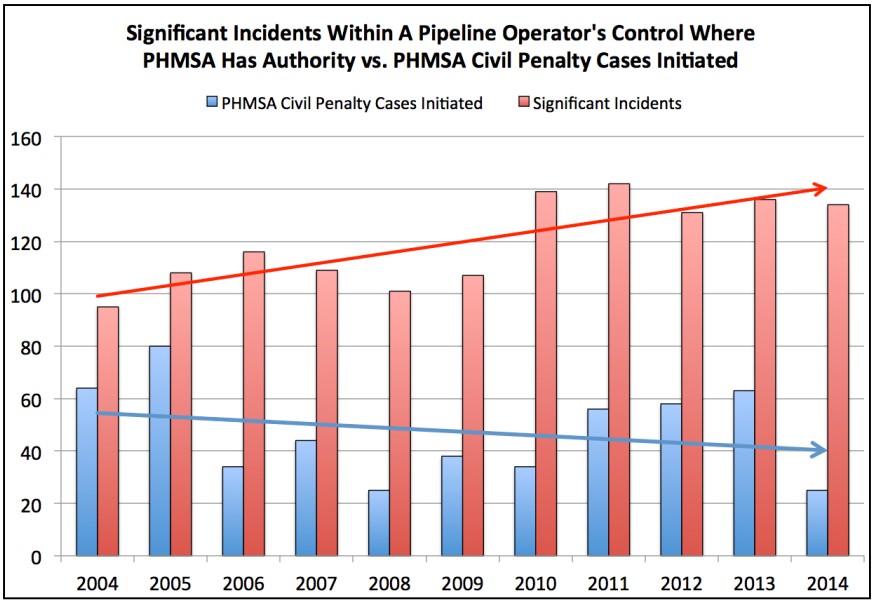
Indicators That Show Regulatory Effectiveness

Goal of Indicator – Provide indicators that show how well regulators are providing safety oversight.

For the most part people do not want to have to think about pipeline safety, and certainly do not want to have spend time wading through often conflicting data interpretations to try to decide whether pipelines are safe enough. They also do not want to have to feel that to protect their communities they need to become pipeline literate so they can support or push for needed pipeline safety improvements. The public views all of these things as the primary job of regulators, but for a whole range of reasons, fed by still too frequent major well publicized pipeline failures, people have lost trust that safety regulators are always putting safety first. People have also started to question the sincerity of legislators who always say that safety comes first, but too often through funding cuts or legislation that constrains regulator's abilities, have created a system that many view prioritizes the welfare of the oil and gas industry over the safety of individual landowners or communities. From our experience with regulators and the industry we think it is often a mistake to paint all regulators or all within the industry with the same brush, which is why it is important to not only create indicators that show industry and individual company performance, but also indicators that show how well regulators are performing their responsibilities.

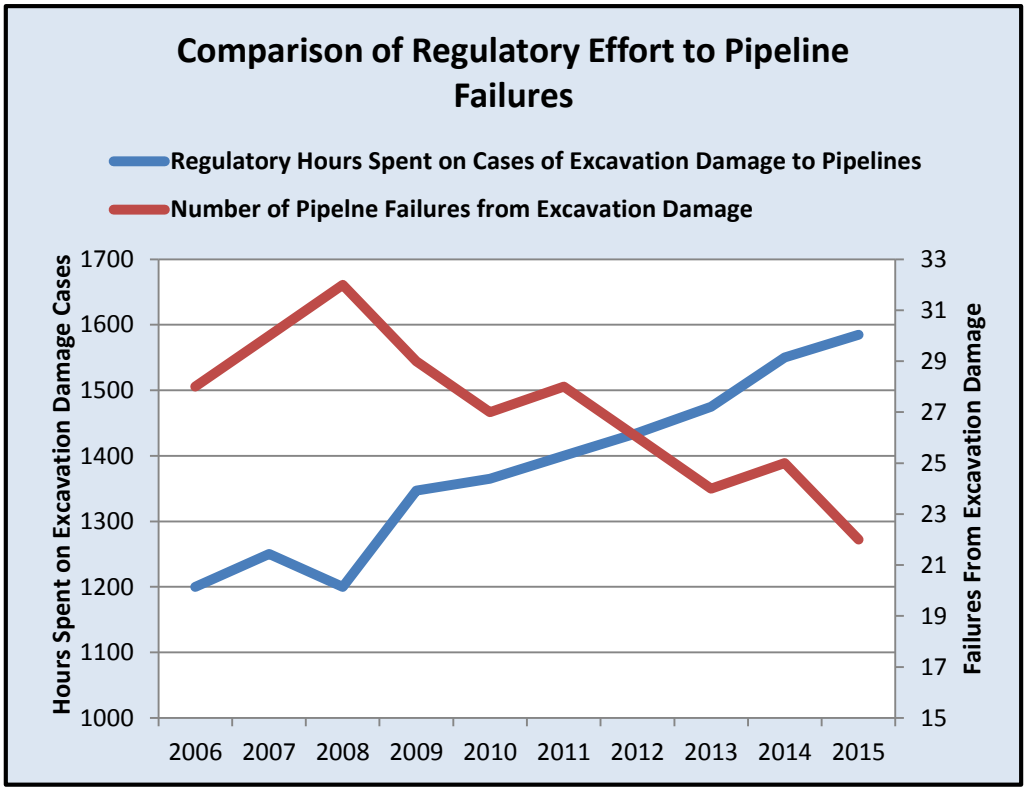
Since regulators do not own, construct, operate, test, or maintain pipelines coming up with indicators on their performance that clearly has a nexus with pipeline safety is difficult. Often such indicators are measures of things such as the number of inspectors, or fines levied, or hours spent performing various oversight tasks. Such quantitative measures, while they certainly provide some information, don't get to the quality of those efforts and whether they have had any affect on pipeline safety. For those reasons we think that the best indicators of regulator performance need to tie regulatory effort directly to other measurable pipeline safety indicators. Below are some examples of the things we are talking about.

Examples:
Number of Enforcement Activities Compared to Number of Failures (real data)

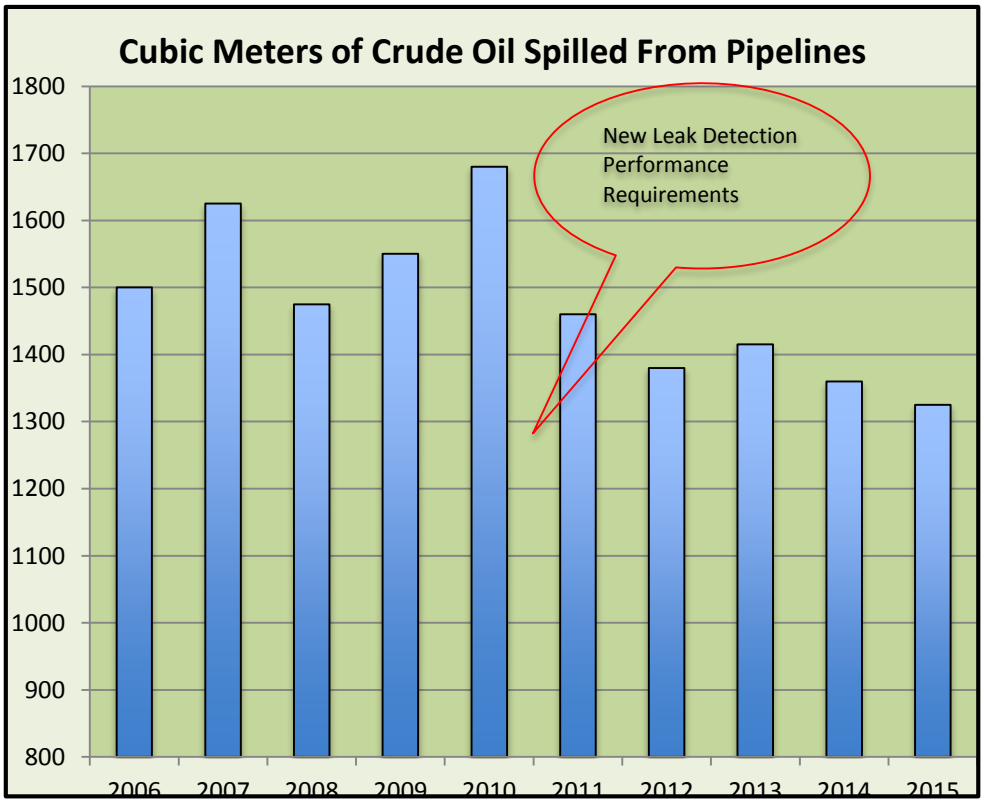


Examples:

Hours Spent Investigating and Enforcing Excavation Damage Prevention Rules Compared to Number of Excavation Damages (fictional data)



When New Rules Went Into Effect Compared to the Performance Indicator the Rule Was Meant To Improve (fictional data)



Issues and Barriers to Implementing Indicators

It should come as no surprise that implementing consistent safety indicators for all pipelines in Canada will not be an easy task, but is an important task to continue to work on. Too often data that is difficult or nearly impossible to compare because of differing definitions and reporting requirements gets compared mistakenly, which leads to incorrect safety assumptions and beliefs. These problems have already been recognized by the Western Regulators' Forum, and they have agreed to **"collaborate in specific regulatory areas, including exploring a one-window approach in communicating pipeline safety indicators."** Some of the basic issues and barriers to developing such a one-window approach for indicators includes:

Variety of Authorities – Canada has a number of agencies providing oversight of pipeline safety for a variety of different pipelines. The NEB oversees federal inter-provincial pipelines, while the provinces often through different agencies oversees intra-provincial pipelines including pipelines similar to those the NEB oversees, as well as upstream pipelines in production areas, and natural gas distribution pipelines that deliver gas to homes and businesses. These different agencies have independent authorities, and differing safety priorities and cultures. They also independently make a variety of sources of information available to the public, but rarely do they explain the limitation of this information in terms of how it is just a piece of a larger Canadian pipeline system. In the fall of 2015 the Office of the Auditor General of Canada noted many of these same problems while auditing the performance of the NEB. Regarding the NEB's very worthwhile interactive incident map they noted:

> ***"However, the map does not include information on incidents outside the Board's jurisdiction. Stakeholders and other agencies such as the Alberta Energy Regulator, the Canadian Energy Pipeline Association, and the transportation Safety Board of Canada also collect information on pipeline incidents. The National Energy Board may wish to consider and discuss with partners the merit of integrating all information on incidents in one map."***

Lack of harmonization and clarity of reporting requirements – Many of the agencies involved in oversight of pipeline safety in Canada have different definitions of what constitutes an "incident." They have different reporting forms, different reporting thresholds, different types of pipelines, different measurement units, and different failure cause categories. While the information collected by each separate regulator may be of good use to that regulator, trying to harmonize all the variables to create an accurate "one-window" portal to provide understandable indicators that tell a coherent pipeline safety story is a challenge. Regulators need to come together to agree upon a set of basic data definitions, measurements and reporting requirements so standard information can be easily pulled from each separate regulator's data to create nationwide indicators.

Lack of accuracy and consistency in reporting – Our cursory review of data from a couple different Canadian regulators identified some concerns about the accuracy and consistency of the data being reported by the industry. Too often we saw data categories left blank, even when such information would seem needed for filing the report. For instance in too many cases there were incident reports filed because of "release of substance" but the data field for supplying the volume of the substance that was released was left blank. From previous work in the U.S. we also have come to realize how difficult it is, without clear guidance, to properly report failure causes and amounts released.

Small Data Pool – The reality is that while there is a clear need for pipeline safety indicators if the industry is ever to meet its stated goal of zero incidents, the fact is that pipelines are relatively safe and incidents do not occur at frequencies that allow for strong statistical analysis and related indicators. For example, in 2015 there were only 89 reportable events on all NEB regulated pipelines. Many of those events would not be included in our proposed indicators because they were not related to a release of product. With such a small number of incidents one significant release can skew any indicator based on average numbers for that particular year, and could produce statistically unreliable indicators. The more comparable data that is in the data pool the more reliable trend lines based on that data will be. This is one reason why we think it is important to get NEB data integrated with provincial data.

Trust issues – Our survey confirmed what industry and regulators alike have already acknowledged, that trust in information provided by the industry or even regulators is pretty low from a significant segment of the public that is paying attention to pipeline safety issues. The industry is viewed as having a clear conflict of interest when it comes to providing any information that could paint their safety record in a negative light. Some regulators, even though they do not own, operate, or maintain pipelines, either because of conflicting mandates or for fear industry's performance will be viewed as a reflection of their performance, too often fall into the trap of painting a rosy picture of pipeline safety. The example we used early in this report where Natural Resources Canada put out information claiming that 100% of spills from liquid pipelines were recovered may be an example of conflicting mandates since they are charged with the **"development and use of Canada's natural resources and the competitiveness of Canada's natural resources products."**

For indicators such as we have proposed in this report to be actually useful and used by the public an implementation and hosting organization needs to be chosen that a broad segment of the public trusts. Perhaps that could be a single entity, but more likely needs to include a broad spectrum of concerned stakeholders. The chosen organization also needs to have the expertise and resources necessary to take on a long-term commitment for such an indicator effort. For those reasons we think that either the NEB or TSB could be such an implementation organization, but only if there is complete data transparency and ongoing review and comment by a knowledgeable external advisory committee made up of involved stakeholders with a majority of them being from public interest organizations.

The Benefit of Canadian-U.S. Cross Border Indicators

There are many major pipelines and many pipeline companies that operate on both sides of the border. News stories about major pipeline failures are reported on both sides of the border, and comparisons of regulatory issues and pipeline safety data between the two countries are also made, often incorrectly. The federal regulators in both countries have begun to produce pipeline safety indicators, but because of very different reporting requirements and definitions, seemingly similar indicators cannot be accurately compared. If a harmonized system of data collection and indicators is to be created in Canada for efficiency and cost savings it makes sense to at the same time consider harmonizing that system with U.S. data and indicators. The creation of truly comparable data and indicators would allow analysis of the effectiveness of the different regulatory approaches used on both sides of the border, which hopefully could lead to pipeline safety improvements on both sides of the border as well. It would also allow a more accurate view of individual pipeline company's performance by creating a stronger data set. The barriers to such cross border data harmonization are considerable, but if zero failures is really the goal on both sides of the border, then a serious investigation into cross border harmonization needs to happen now, before either country further sets in stone a system that will not be comparable across the border.

Next Steps

On May 19, 2016 the Pipeline Safety Trust, with assistance from CEPA, held a public forum in Calgary on possible Canadian Indicators and the associated transparency of information. The draft of this report, sent to all participants a week before the forum, was used to jumpstart the conversation between the interested public, regulators, and the pipeline industry. 53 people attended the Forum in Calgary, and the mix of attendees was pretty evenly divided between high-level regulatory staff from the NEB and western provinces, pipeline industry leadership, and representatives from NGOs that had previously been involved with pipeline issues. A couple stakeholder groups that were underrepresented at the forum were the First Nations and local governments. Additional outreach to those groups would be advised as these indicator efforts move forward. A list of the forum attendees can be found here.

Before, during, and since the forum specific feedback on the proposed indicators has been limited. Some suggested that each indicator should have a defined goal, objective, and performance timeframe. We have added some basic goals for each indicator, but decided target performance objectives and timeframes were not necessary at this point in indicator development. Some suggested that more indicator examples using Canadian data be used instead of U.S. data, but this proved nearly impossible since in many instances the Canadian data either does not exist, or is collected by multiple agencies in different forms making consolidation difficult to impossible. There was concern voiced by many of the NGOs that greater emphasis needs to be placed on measuring and reporting on the environmental effects of pipelines, but no specific ideas were given. We did receive valuable comments on some needed changes for clarity to some of the text and indicators, and have made those changes.

During the forum, and since, there has been a good deal of support for creating such indicators and greater transparency of information. It became apparent that there are currently many efforts in the works by regulators and the industry to expand the transparency of information and provide high-level indicators, so discussion of how to make such indicators and transparency meet the desires of the public is very timely. The NEB stated they are committed to making their entire dataset of failure information easily publicly available, and are working on a report due in Ottawa later this year that will include a discussion of transparency and pipeline safety indicators. The Western Regulators Forum, including regulators from the NEB, British Columbia, Alberta, and Saskatchewan have formed a working group to explore creating a "one-window approach in communicating pipeline safety indicators." CEPA continues to push out more information with associated indicators as part of their ongoing communications and Integrity First efforts, and just recently CEPA and the NEB signed a terms of reference agreement to form a Joint Committee to work on a variety of pipeline issues including "common approaches to align pipeline safety indicators."

The main issue we see moving forward, that everyone acknowledged at the forum as important but currently lacking, is a clear mechanism for keeping the concerned public involved in the design and implementation so they will support and trust the final and ongoing products. Both the regulators and the industry stated they would be taking up this indicator and transparency work over the summer and be ready to report back in the fall. There was some talk and support for holding a second forum later in 2016 to discuss in more detail where the regulators have landed on a set of indicators and their ideas on moving forward to harmonize reporting requirements and definitions. We suggest the following steps need to be taken to continue the momentum and involvement of all the stakeholder groups.

1. Work to identify a target date and planning group for some sort of follow up discussion to the first Indicator and Transparency Forum. Our preference is another face-to-face meeting in a convenient location by the end of the year. **The Pipeline Safety Trust will** take on the task of querying the participants on possible dates, and work to determine and enlist the handful of decision makers that need to be involved in the planning.

2. The regulators and the industry need to ensure they do sufficient work on these indicator and transparency issues over the summer and fall to be ready to report back what their desires are regarding indicators, public engagement, and what the realistic timeline is for implementation of these efforts.

3. The "public" that was involved in the initial forum needs to continue to meet electronically to more clearly identify:

- their indicator and transparency desires,
- groups and representatives that were missing from the first forum that are important to reach out to for inclusion at future efforts, and
- some basic structure for how this caucus of non-regulatory / non-industry groups will effectively function.

The Pipeline Safety Trust will take on at least the initial steps of this task.

4. Determine a funding source/s or sponsor/s to cover the costs of:

- hosting a potential second forum
- travel assistance for public participation
- any desired outside facilitation and coordinating

5. Set up a simple communication system for keeping everyone informed of ongoing efforts, seek input, and disseminate logistics.