Abstract:

Regulating Pipeline Safety in Canada.

The National Energy Board regulates the safety and environmental protection of over 45,000 km of oil and natural gas pipelines in Canada. The NEB has been in existence since 1959 and has developed its approach to the regulation of pipeline safety over these years. The NEB=s two principal sets of regulations for pipelines are the Onshore Pipeline Regulations and Pipeline Crossing Regulations. The Onshore Pipeline Regulations specify the requirements for the design construction and operation of pipelines. These regulations have recently been revised to become more goal-oriented with the intent of improving their effectiveness. The Pipeline Crossing Regulations address the prevention of third party damage to the pipelines and is in the process of being redrafted as the Damage Prevention Regulations. The NEB=s experience with regulating pipeline safety and its current approaches will be discussed.

Biographical note:

John McCarthy

John joined the National Energy Board in 1982 as a pipeline engineer. He has held numerous positions since that time including Chief Engineer. In 1996 he was appointed to his current position of Business Leader, Operations. In that role he has executive accountability for Operations Business Unit which is responsible for the NEB's safety and environmental regulatory program and for providing engineering, and environmental advice to the Board on pipeline and upstream exploration and production issues. He is also the Chief Safety Officer under Canada Oil and Gas Operations Act.

John has a degree in Mechanical Engineering from Carleton University and a Masters of Business Administration from the University of Calgary. John lives in Calgary and he and his wife, Joanne, spend most of their spare time raising their three sons.

Regulating Pipeline Safety in Canada

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Introduction

Thank you for inviting me to address this congress to-day. I have been asked to speak about how pipeline safety is regulated in Canada. I am pleased to share with you the experiences of the National Energy Board and hopefully this will be helpful as your continue to develop regulatory regimes and strive, as we do, to improve the safety of pipelines.

The energy industry in Canada

By way of background it may be helpful to give you a very brief overview of the energy Industry in Canada. Canada=s large oil and gas reserves and increasing production of this wealth have contributed to the energy sectors important role in the Canadian economy. In 1999, the energy industry accounted for approximately 6 percent of the nation=s Gross Domestic Product and eight percent of its total merchandise exports and employed 281 000 Canadians.

In Canada the vast majority of oil and gas reserves are located in western Canada in the Western Canadian Sedimentary Basin and since the 1950s, pipelines have connected this supply with markets in the east and west and increasingly to export markets in the United States. Today Canada produces over 330 000 thousand cubic metres of crude oil and equivalent per day (2.1 million barrels per day). Canada is a net exporter of oil, exporting from western Canada while meeting eastern Canada=s needs through imports from the North Sea, Venezuela and other regions.

Considering natural gas for a moment, Canada produces over 160 billion cubic metres of natural gas every year (5.7 TCF) and exports approximately 55% of this to the United States.

In recent years, significant production of petroleum and natural gas has started in Canada=s eastern offshore areas. Construction of a new mainline system to connect offshore natural gas resources to markets in Eastern Canada and the United States was completed last year. As petroleum prices continue to be high, exploration and production activity has been increasing

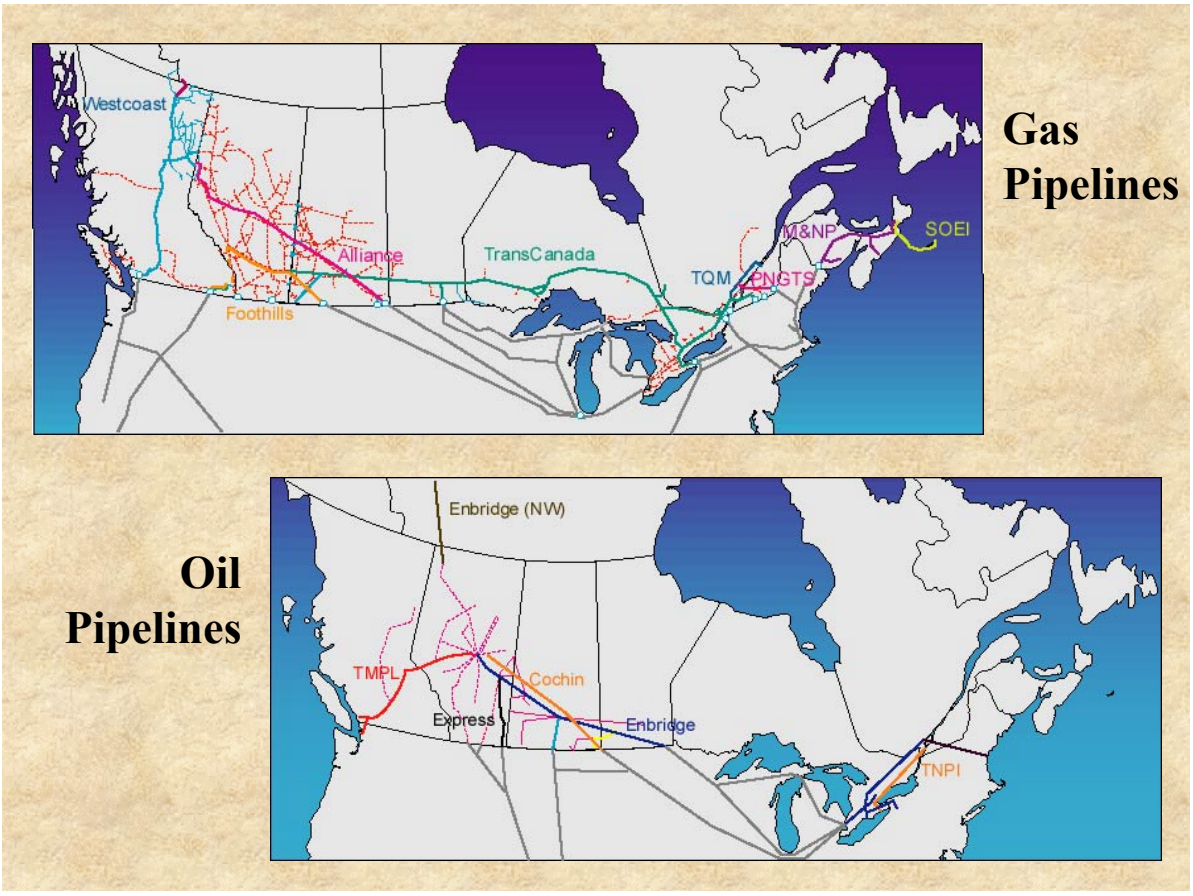
very significantly in Northern Canada . The far north of Canada has very significant petroleum and natural gas resources and industry is now developing plans for a pipeline to connect the natural gas reserves in the Arctic and Alaska to southern markets.

Mandate of NEB

The National Energy Board is a federal independent regulatory tribunal which was established in 1959. The NEB has both regulatory and advisory responsibilities, which can be summarized as follows:

1. Regulatory
$ Construction and operation of pipelines, especially environment and safety
$ Pipeline tolls and tariffs
$ International trade in oil, gas and electricity
$ Oil and gas exploration and production regulation (outside provinces and Accord areas)

2. Advisory
$ Monitors energy sector
$ Provides advice to federal government
$ Issues public reports (e.g. Energy Supply & Demand)



The Board is an independent regulatory tribunal that reports to Parliament through the Minister of Natural Resources. Currently the Board has eight permanent members who are appointed by the government to seven year terms. Board members are independent of government and their terms are not affected should the government change. Except in a few specific areas, the decisions of the Board are not subject to cabinet approval. Board decisions can be appealed to the federal court of Appeal on matters of jurisdiction and procedure. The Board has the powers of a court and can conduct hearings and subpoenas witnesses. In addition, the Board has a staff of approximately 300 from a variety of disciplines related to energy matters.

The constitution gives the responsibility for resource exploitation to the provinces and interprovincial and international trade to the federal government. Accordingly, the National Energy Board in responsible for regulating all of the international and interprovincial pipelines in Canada. Federally regulated pipelines represent slightly less than 50,000 kilometres of pipeline the over 500,000 kilometres of pipelines in Canada. Although there are many exceptions to the rule, federally regulated pipelines tend to be the larger transmission systems. Many of these systems, such as the TransCanada natural gas pipeline system and the Enbridge oil pipeline are among the largest pipeline systems in North America. As a general rule, gathering systems and distribution systems are regulated by the provinces.

Two years ago, the NEB developed a business plan to help focus our day to day efforts. The business plan defined a purpose and vision for the organization and established clear goals. The Board=s purpose is to Apromote safety, environmental protection, and economic efficiency in the Canadian public interest while respecting individual rights and within the mandate set by Parliament in the regulation of pipelines, energy development, and trade.@ In fulfilling this purpose we aspire to be Aa respected leader in safety, environmental protection, and economic regulation.@

To meet these challenges, the Board has set four overriding goals. The goals are illusive and are expressed as an end state to which we are focusing our efforts.

Goal 1: NEB regulated facilities are safe and perceived to be safe
Goal 2: NEB regulated facilities are built and operated in a manner that protects the environment and respects individual rights
Goal 3: Canadians derive the benefits of economic efficiency
Goal 4: NEB meets the evolving needs of the public to engage in NEB matters

For each goal, we have established measures to determine how far we are from the goal and to indicate progress towards the goal. These goals are all interrelated and I=ll briefly outline each one in reverse order and then focus on the first two goals which primarily relate to pipeline integrity.

The Board meets the evolving needs of the public to engage in NEB matters. This goal in many ways is all encompassing. Our mandate is to make decisions that are in the public interest. In order to decide in the public interest we have to gather information from all sources to ensure all information critical to a decision has been heard. Also, communication is critical in promoting

our goals of safety, environmental protection, and economic efficiency. Further, our efforts and decisions need to be fair and seen to be fair. When we build our programs for each of the other three goals, we need to communicate with our audience. Thus, success in this goal is necessary to be truly successful in the other three goals.

When we talk about engaging the public we need to be aware that there are different constituents or communities of interest, each with its own particular needs and preferences. It is naive to imagine that our public is the entire Canadian population and that one message is sufficient. While Canadians as a whole might have an interest in NEB matters, there are identifiable communities that have interactions with the Board and that we need to engage. The communities of interest include regulated companies, other energy companies that are affected by the Board=s decisions, non-governmental or advocacy groups, landowners, government departments at federal, provincial/territorial, and municipal levels, aboriginal or First Nations Peoples, and people affected by energy developments.

In order to improve the way we communicate, we have taken a number of concrete steps. The Board has been developing an Electronic Regulatory Filing system that is intended to allow stakeholders to examine and exchange information electronically over the Internet. We offer informal public information sessions in affected communities as part of the pre-hearing process, and we are conducting landowner and hearing participant surveys. The information sessions provide guidance to people not familiar with the Board=s process and build confidence in the Board=s process. The surveys provide insights on the issues of importance to these communities, the effectiveness of our programs, and identification of areas requiring improvement. There are many opportunities to improving our public engagement and to become a more accessible organization.

The next goal is Canadians derive the benefits of economic efficiency. The Board=s objective in this goal is to ensure, to the extent that it influences economic outcomes, that Canadians derive the benefits of economic efficiency. There are arguably three aspects of economic efficiency related to the Board=s mandate. Firstly, in many areas, pipelines have a monopoly on the transportation of energy. Where there is significant market power exerted by few companies, Board influences the operation of the industry through the decisions it makes that impact the cost of providing service, returns to pipelines, the degree of competition in the industry, etc. The Board=s decisions promote of a low cost transportation network; ensure that transportation services meet shippers needs with respect to service mix and options; and promote rational investment decisions.

Secondly, the Board=s can impose a cost on industry. On a very simple level, the NEB=s costs are recovered directly from industry and thereby constitute a tax on the industry. More importantly, the Board influences economic efficiency through the timeliness and effectiveness of its regulatory procedures and can impose costs on industry if its regulatory processes are unnecessarily cumbersome or delay economically beneficial projects with no offsetting gains in public protection. Market participants want to do business within a clear regulatory framework. Regulatory uncertainty causes risk for market participants, and risk translates into increased

business costs.

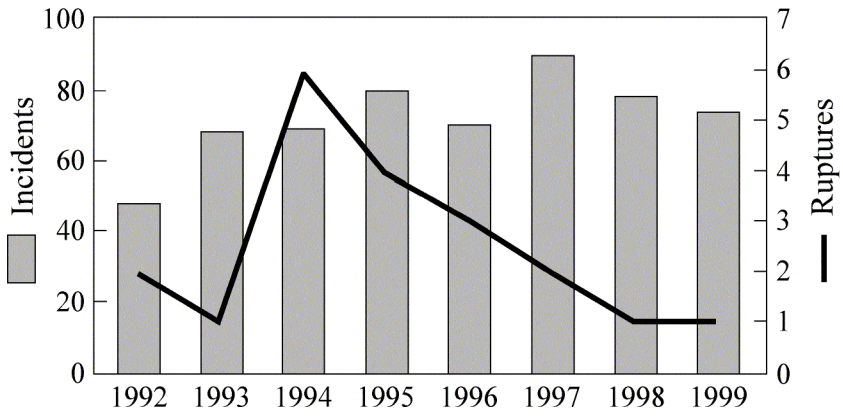
Our third contribution to economic efficiency is as an independent neutral source of energy market information. Board-provided information and analysis may assist industry decision making. For example, on a three or four year cycle, the NEB conducts a comprehensive analysis of the Canadian energy supply and demand balance and develops a twenty year forecast. We have found that there is a need for additional interim reports on specific topics and issues.

The last two goals relate to our role in regulating safety and environmental protection. ANEB regulated facilities are built and operated in a manner that protects the environment and respects individual rights@ and ANEB-regulated facilities are safe and perceived to be safe@

Pipelines carry hazardous materials. These products can pose a danger to the public and the environment. It is a danger, however, that can be effectively managed through competent design, construction, and maintenance practices.

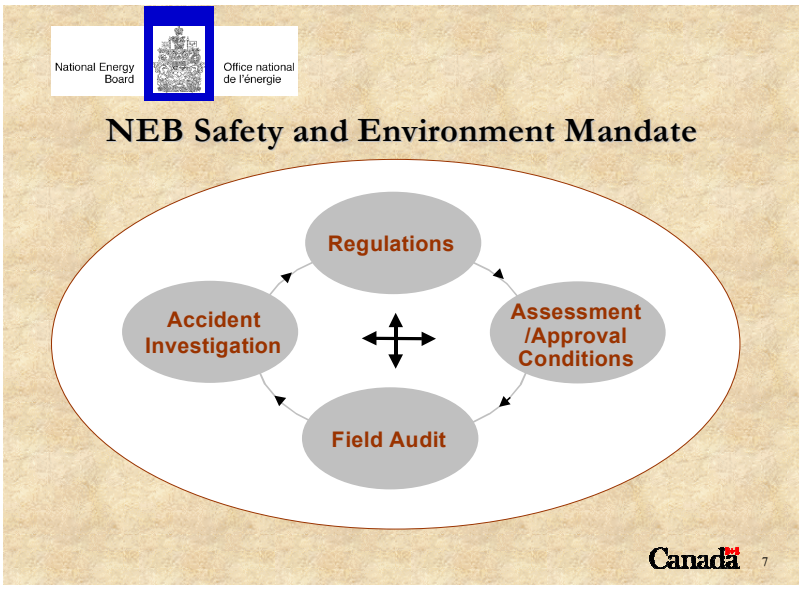
The figure illustrates the number of incidents (reportable events as defined in the regulations) and the number of ruptures on NEB-regulated pipelines (that is, those incidents which pose a significant threat to the public or the environment) over the past eight years.

Figure 1: Incidents and Ruptures on NEB-Regulated Pipelines



Looking at this data you get a hopeful sense that the inherent risk of pipelines is being well managed. The number of incidents on NEB regulated pipelines has decreased in recent years from a high of 88 in 1997 to 74 in 1999. Data compiled so far this year indicates we are headed for an even lower number. These incidents include construction accidents, other worker injuries, as well as releases at stations and along the right of way. Although these are all treated seriously, most of the pipeline incidents reported to the NEB did not pose a hazard to the public or the environment. Of the 74 incidents reported in 1999, 15 resulted in injuries to workers undertaking maintenance and construction activities. Over two thirds of the incidents occurred in controlled areas such as pump stations and gas plants, which are unlikely to impact landowners and the public. The fact that the number of incidents has been steady or slightly declining is particularly

noteworthy given that the amount of pipeline under NEB jurisdiction has increased by nearly 20 percent in the past five years.



Perhaps a better indicator of public safety is the number of ruptures experienced. Ruptures are the complete failure of the pipeline and loss of containment. These are the incidents which have the potential for injuries and deaths and significant damage to the environment. They are the events that make the newspaper headlines and have the ability to instantaneously raise public unease about the safety of pipelines. Here the industry has done a good job of reducing the frequency of these events from a high of 6 in 1994 to just one a year in each of the past two years.

The NEB=s safety and environmental protection program has four essential elements as illustrated on the below figure. The NEB establishes regulations related to the design construction and abandonment of facilities under NEB jurisdiction. New applications are assessed to determine whether the project is in the public interest in light of safety and environmental protection issues. If the project is approved, frequently conditions related to environmental or safety concerns are attached to the approval. As the project moves to the construction and operation phase, the NEB monitors to ensure the approval conditions and regulations are respected. If something goes wrong the NEB investigates the accident and sees what measures can be taken to prevent a recurrence. The goal of the program is to ensure that lessons learned at any of the phases are shared and incorporated into the other phases.

In the past regulations were very detailed and described exactly what the company had to do and how it had to do it. This approach has increasingly come under pressure as the detailed regulatory requirements quickly became out-of-date and either resulted in no increase in safety or companies routinely sought exemptions from the regulations on Apractical@ grounds.

Not all pipelines are the same. Canadian pipeline systems have expanded steadily over the past decade and it is important to recognize that the risks associated with each system are unique. For example, the appropriateness of the an integrity management program for a specific pipeline would be a function of the products carried by the pipeline, the age and pressure of the system, the coating and corrosion protection system, the environment, the land use around the pipeline, the type of soils, and incident and maintenance history. It would be impossible to specify

precisely how these factors should be considered and integrated into the design of an integrity management program.
To enable the industry to rationally address the risks, the Board has moved towards Agoal-oriented regulations@. Goal-oriented regulation describes the goal of the regulation and the company is required to demonstrate the adequacy and effectiveness of the methods employed to meet the regulations. This promotes adaptation of new technology and encourages pro-active management systems.

Goal-oriented regulation is not self regulation. Canadians need the confidence that their safety is being protected through regulation and the NEB retains a major oversight responsibility through inspections and audits. As well, the goal-oriented approach continues to reference detailed consensus standards such as Canadian Standards Association 662 which relate to the design, construction, and operation practices that have been proven over the years. Theses are minimum standards which must be observed.

Our approach to goal-oriented regulation can be illustrated in the case of the integrity management program. The regulations require that Aall pipelines shall have a integrity management program@. The accompanying non-mandatory guidance notes explain the goal of the regulatory requirement as ATo ensure that pipelines are suitable for continued safe, reliable and environmentally responsible service.@ and provide information on how this can be achieved. In the case of the Integrity Management Program there are four basic components described. The regulations do not prescribe the components of the program and the company is free to select any alternate approach to the program, however the onus is on the companies to demonstrate the adequacy and effectiveness of the methods employed.

In addition to ensuring safety, it is critical that Canadians living and working near pipelines feel safe. For that reason our first goal has a second component which is that the public perceives that pipelines are safe. The Board is continually looking for ways to involve the public and encourages pipeline companies to provide information on pipeline safety performance. The Board has been working to develop a set of key safety indicators, which will be tracked year to year. Sharing this information with the public should help promote a factual perception of the level of safety of the regulated facilities. The participation of regulated companies in these measures and communications will also help maintain or improve public confidence in the safety of pipelines.

The Board believes that effective management systems are an integral part of managing safety and protection of the environment. We have required a systems approach as part of the Onshore Pipeline Regulations, 1999. For example, we require companies to have an environmental management system and have made references in the guidance notes to the ISO 14000 series of standards. To show that we take our own advice, the Board is adopting a systems approach to the design of its internal regulatory program.

Our internal Environmental Management Program is based on ISO 14000 principles as illustrated in the graphic. The development of an Environmental Management Program will help to integrate our environmental efforts as well as assist in clarifying our role, expectations, and responsibilities for environmental protection for all interested parties. We are also developing a complementary Safety Management Program that will provide a framework for our safety program.

The Board continues to conduct inspections and audits to ensure that companies are complying with regulations, undertakings, and application approval conditions. Inspections during the construction phase is a mechanism for the Board to monitor activities when construction activity is underway. The presence of Board Inspection and Safety Officers helps ensure compliance with regulations and conditions. It also enables the Board to be more aware of any issues between the company and landowners and in a position to facilitate solutions between parties. Audits enable the Board to evaluate how well the companies promote and ensure safety and protection of environment by evaluating their environment and safety management systems. Both these activities strengthen protection of the environment and safety and the perception of these factors.

One of the major lessons from the move towards goal-oriented regulation has been the need for knowledgeable auditors. The goal-oriented regulation approach requires an auditor to evaluate a company=s approach and proposed methodology against the goal and intent of the regulations. The auditor has to have a solid understanding of issues, alternative approaches, best practices, and the confidence that their assessment is appropriate. We have decided to use teams to improve our ability to effectively audit. Clearly the required skills and experience of auditors has increased over a simple compliance inspection.

The implementation of the OPR-99 cannot happen over night. The vision of goal oriented regulation is pro-active and effective management systems addressing system specific issues. The vision also includes competent auditors understanding the systems and adding value to the operator by identifying things that are working well and others that need improvement. This will take time to achieve. Auditor training has been a major consideration for us in the past year. We have decided to focus our initial audits on the important areas of pipeline integrity and emergency response.

I=d like to briefly address our program to deal with third party damage. Third party damage has not been a major causes of pipeline incidents. For example, in 1999, only 3% of the reported incidents were caused by third party damage. Nonetheless, third party damage remains one of the most significant risks to public safety as demonstrated in other jurisdictions.

In1985, following a fatality where a contractor installing drainage tiles ruptured a natural gas pipeline, the Board developed the Pipeline Crossing Regulations to address the risk of third party damage. The regulations require contractors and landowners to request approval from the pipeline company prior to excavating within 30 metres of the pipeline. The regulations also require the companies to have a public awareness program to advise contractors and landowners of the location and hazards of buried pipelines. The NEB has hosted a series of successful workshops on public awareness programs which enable companies to share best practices.

In 2000, we started a review of our Pipeline Crossing Regulations and have recently completed a major consultation exercise with pipeline companies, municipalities and the public. Our intent is to replace these regulations with the Damage Prevention Regulations in the next year. The major change in the regulatory environment since 1985 has been the steady development of voluntary one-call centres across Canada. These centres have successfully promoted ACall Before You Dig@ campaigns and will be a part of the ongoing strategy to address this risk.

Regulating safety is a challenge to governments and regulatory agencies everywhere, over the past 40 years we have learned and adapted our approach in response to new challenges. In the future we will change our approach again. Like our goals we will never be completely satisfied that NEB-regulated facilities are safe and are perceived to be safe. If you wish further information on the NEB regulatory program please consult the National Energy Board=s web-site at www.neb.gc.ca. I hope my comments were of use to you in your reflection on pipeline integrity.