

SENATE



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August 2013

Moving Energy Safely

A Study of the Safe Transport of Hydrocarbons by Pipelines, Tankers and Railcars in Canada

Standing Senate Committee on Energy,
the Environment and Natural Resources





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THE COMMITTEE

Members of the Standing Senate Committee on Energy, the Environment and Natural Resources:

The Honourable Richard Neufeld – *Chair*

The Honourable Grant Mitchell – *Deputy Chair*

The Honourable Daniel Lang

The Honourable Michael L. MacDonald

The Honourable Paul J. Massicotte

The Honourable Elaine McCoy

The Honourable Dennis Glen Patterson

The Honourable Pierrette Ringuette

The Honourable Judith G. Seidman

The Honourable Nick G. Sibbeston

The Honourable Betty E. Unger

The Honourable John D. Wallace

Ex-officio members of the committee:

The Honourable Senators Marjory LeBreton, P.C. (or Claude Carignan)
and James S. Cowan (or Claudette Tardif).

In addition, the Honourable Senators Brown, Demers, Enverga Jr., Johnson and Ogilvie were members of the committee or participated from time to time during this study.

Staff of the committee:

Ms. Lynn Gordon, Clerk of the Committee, Committees Directorate;

Ms. Maritza Jean-Pierre, Administrative Assistant, Committees Directorate;

Mr. Marc LeBlanc and Ms. Sam Banks, Analysts, Parliamentary Information and Research Services,
Library of Parliament;

Ms. Ceri Au, Communications Officer, Communications Directorate.

LIST OF WITNESSES

Available on the web site:

<http://www.senate-senat.ca/enev.asp>



ORDER OF REFERENCE

Extract from the *Journals of the Senate*, Wednesday, November 28th, 2012:

The Honourable Senator Neufeld moved, seconded by the Honourable Senator Marshall:

That the Standing Senate Committee on Energy, the Environment and Natural Resources be authorized to examine and report on the current state of the safety elements of the bulk transport of hydrocarbon products in Canada. In particular, the committee shall be authorized to:

Examine the life cycle of hydrocarbon transmission pipelines across Canada, including but not limited to pipeline design, construction, operation, spill response and abandonment;

Examine the federal and provincial/territorial roles in hydrocarbon transmission pipeline oversight, including but not limited to legislation and regulations, standards, integrity management systems, monitoring, compliance and verification activities and incident response plans;

Examine the federal and provincial/territorial roles in ensuring the safety of the movement of hydrocarbon products via marine tanker vessels, including but not limited to legislation and regulations, standards, inspection and enforcement measures, risk management systems and incident response plans;

Examine the federal and provincial/territorial roles in ensuring the safety of rail transportation of hydrocarbon products, including but not limited to legislation and regulations, standards, inspection and enforcement measures, risk managements systems and incident response plans;

Examine and compare domestic and international regulatory regimes, standards, and best practices relating to the safe transport of hydrocarbons by transmission pipelines, marine tanker vessels and railcars;

Recommend specific measures to enhance the safety elements of the bulk transport of hydrocarbon products in Canada; and

That the committee submit its final report no later than June 30, 2013 and that the committee retain all powers necessary to publicize its findings until 180 days after the tabling of the final report.

The question being put on the motion, it was adopted.

Extract from the *Journals of the Senate*, Thursday, June 6, 2013:

The Honourable Senator Mitchell moved, seconded by the Honourable Senator Lovelace Nicholas:

That, notwithstanding the order of the Senate adopted on Wednesday, November 28, 2012, the date for the final report of the Standing Senate Committee on Energy, the Environment and Natural Resources in relation to its study on the current state of the safety elements of the bulk transport of hydrocarbon products in Canada be extended from June 30, 2013 to December 31, 2013.

After debate,

The question being put on the motion, it was adopted.

Gary W. O'Brien
Clerk of the Senate



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EXECUTIVE SUMMARY

On November 28, 2012, the Standing Senate Committee on Energy, the Environment and Natural Resources initiated a study of the safe transportation of bulk hydrocarbons by transmission pipelines, tankers and railcars in Canada.

The goal was to examine the current state of emergency and spill prevention, preparedness and response frameworks under federal authority and to make recommendations to improve public safety and the protection of the environment.

The study is set within the context of growing hydrocarbon production in North America and the need to secure and diversify export markets. It is expected that pipelines, tankers and rail will expand their existing capacity and/or routes as hydrocarbon production increases.

The shocking Lac-Mégantic rail disaster that took place on July 6, 2013, has intensified the need to address hydrocarbons transportation safety. Due to the scope of the disaster, the committee concluded that an arm's-length review of rail safety is necessary in Canada. The committee also made specific recommendations aimed at improving railway safety culture and enhancing rail safety for tank cars, regulatory oversight of the transport of dangerous goods and liability thresholds related to rail accidents. It was recommended that Transport Canada work in partnership with railway companies to make existing safety culture assessments mandatory within its audit program.

Including rail transportation recommendations, the committee made a total of 13 recommendations. There are five recommendations related to marine spills. They include expanding spill data collection, modernizing spill preparedness and response capacities and providing responder immunity protection for marine response organizations that assist in non-ship source marine spills.

There are two pipeline recommendations: first, that the National Energy Board develop a program to audit for safety culture; and second, that the federal government facilitate a national access point for information on buried utility infrastructure to prevent third-party damage by excavators. There is one general recommendation to the National Energy Board and Transport Canada to provide information on transportation-related oil and gas spills in an accessible manner.

For the most part, oil and natural gas are moved safely in Canada. Transmission pipelines moved liquid product 99.9996% of the time without spills in Canada¹ and railcars have an average of 99.9% for dangerous goods.² This type of ratio was not available for tankers but major tanker spills are rare; the last one that occurred in Canada was over 30 years ago.

Transportation systems operate within a highly regulated environment. There are extensive regulatory frameworks, management systems, standards and practices all serving to promote safety. However, no activity is without risk. Hydrocarbon spills do occur and sometimes major disasters happen. Each major accident is carefully examined to learn what went wrong so that improvements can be made.



SUMMARY OF RECOMMENDATIONS

General

1. That the National Energy Board and Transport Canada create a web portal that includes interactive maps indicating detailed information on spills and incidents for pipelines, tankers and railcars, such as the types of product released and, as soon as possible, the cause of the incident.

Pipelines

2. That the National Energy Board work in partnership with regulated companies and experts in safety culture to develop a program for the mandatory auditing of safety culture.
3. That the federal government facilitate efforts to establish a national access point for information on the location of buried infrastructure, as well as the promotion of one-call centres and call-before-you-dig initiatives. Information on the coordinates of underground infrastructure should be consulted prior to any excavation activities by a third party.

Tankers

4. That the Transportation Safety Board expand and modernize its database to provide detailed information on ship-sourced spills, including the type of ship and the volume and type of product released.
5. That the current spill preparedness and response capacity of 10,000 tonnes within prescribed timeframes be adjusted upwards to fit the assessed needs of each region as determined by Transport Canada.
6. That the federal government provide umbrella responder immunity protection to Canadian marine response organizations for all non-ship source spills including marine spills from pipelines, trains and trucks.
7. That the Canadian Coast Guard's mandated spill preparedness and response capabilities be certified by Transport Canada or an arm's-length agency periodically.
8. The committee believes that, in certain areas and under specified circumstances, certified marine response organizations should be pre-approved to use dispersant, initiate controlled burning and take other prescribed counter-measures when it yields a net environmental benefit.

Rail

9. That Transport Canada work in partnership with railway companies to make existing safety culture assessments mandatory within its audit program.
10. That the federal government initiate a major arm's-length review of the country's railway regulatory framework, standards and industry practices to meaningfully advance the safe transportation of dangerous goods by rail in Canada.
11. That Transport Canada review, in cooperation with the United States Department of Transportation, the use of CTC-111A and DOT-111 tank cars and consider accelerating the transition to the revised standard.
12. That Transport Canada implement all the recommendations from the December 2011 Report of the Commissioner of the Environment and Sustainable Development related to the transport of dangerous goods by rail.
13. That Transport Canada apply appropriate minimum liability coverage thresholds to ensure rail companies have the financial capacity to cover damages caused by a major incident.



INTRODUCTION

On July 6, 2013, at 1:14 a.m., a train carrying numerous tank cars of crude oil derailed in the town of Lac-Mégantic, Québec, resulting in a devastating explosion and the loss of at least 47 lives. This was a shocking accident and our hearts go out to the families and friends of those who have lost loved ones.

It will take some time before all the facts of this tragedy are uncovered. However, there can be no doubt that the accident underscored concerns many Canadians already had about the safety of transporting hydrocarbons and the risk to the public and the environment, particularly as North America is expanding its oil and natural gas production.

It was these concerns which led the committee to seek authorization from the Senate on November 28, 2012, to initiate a study on the safe transportation of bulk hydrocarbons by transmission pipelines, tankers and railcars in Canada. Our goal was to examine the current state of emergency and spill prevention, preparedness and response programs under federal authority and make any necessary recommendations to improve public safety and the protection of the environment.

During the course of the study, the committee held 18 hearings and heard from 51 witnesses consisting of government officials, industry representatives, spill response organizations, environmental organizations, landowners and other stakeholders. Committee members met with organizations and individuals and conducted site visits in Calgary, Sarnia, Hamilton, Saint John, Point Tupper, Halifax, Dartmouth, Vancouver, Blaine and Seattle, Washington, and Valdez and Anchorage, Alaska, to learn first-hand about existing transportation safety frameworks applied in those regions.

In the nine months since this study began, there have been several announcements aimed at improving the safety of hydrocarbon transportation. Notably, on July 23, 2013, Transport Canada announced emergency directives to improve rail safety³ and, on March 18, 2013, the federal government announced its intention to create a World-Class Tanker Safety System and the creation of a Tanker Safety Expert Panel to review Canada's current tanker safety system and propose further measures to strengthen it.⁴ It is hoped that recommendations in this study and testimony assist the panel in its review of tanker safety in Canada.

The purpose of this study is not to compare transportation modes and decide the safest means to transport hydrocarbons. The committee believes that all forms of transportation will play a role in our energy future and that all modes of transportation must operate in a manner that protects the safety of Canadians and the environment.

The focus of this report is on the transport of crude oil and natural gas, the most commonly transported hydrocarbon in Canada today and into the future. Significant amounts of refined petroleum products are also moved by rail, pipeline or tanker.

Oil and natural gas do not behave the same way when released into the environment. Crude oil can spread rapidly, especially in water, and it is flammable under certain conditions. Crude can be harmful to the environment; it can also seep into the ground, or sink in water, making recovery challenging. Specialized equipment is required to clean up oil spills.



Natural gas is lighter than air and therefore, rather than spreading over land or water, it can dissipate into the air rapidly and safely, making recovery unnecessary. However, natural gas is flammable at certain concentrations of gas in air. It can be explosive if a rupture occurs while contained in a confined space.

This study begins by setting the economic context for the growth of hydrocarbon transportation, followed by a discussion about the social license that must be earned to advance energy transportation projects; this is where transparency and dialogue are emphasized. The study also briefly outlines the nature of accidents in all three modes, and underscores the importance of fostering a healthy culture of safety within organizations that move oil and gas products.

Pipelines, railcars and tankers have unique operating environments. However, they all share a similar requirement to identify, manage and mitigate risk. While no activity is risk-free, there must be trust in our transportation systems and in the institutions that regulate them and a belief that they are keeping the public safe and the environment free from harm. It is in this context that the committee examines the safety features of each of the transportation modes.



CHANGING ENERGY LANDSCAPE

The Race to New Market Opportunities

North America's supply of energy is being reshaped by two key factors: the growth in Canada's oil sands, and the use of hydraulic fracturing techniques that are unlocking previously uneconomic oil and natural gas deposits. North America's changing energy landscape is being felt throughout the supply chain, and it is having a global reach.

Today, the movement of oil and natural gas to new domestic and international markets - especially the growing Asia Pacific market - is at the forefront of energy policy discussions in Canada. This is because access to Asian markets for Western Canadian oil and natural gas production is virtually non-existent.⁵

Much is at stake since the U.S., essentially our only energy export market, is becoming increasingly energy self-sufficient. This is due to growth in its domestic oil and natural gas supplies, but also because of a decline in energy demand due to energy efficiency gains. Canada is in competition with other jurisdictions to secure growing markets overseas, and could be left behind if we do not find a way to expand and diversify existing markets.⁶

The rapid growth of North America's natural gas supplies have been nothing short of transformative. Until only recently, industry observers believed that demand would outstrip supply.⁷ Today, a complete reversal has occurred where the growth in domestic supplies have Canadian suppliers competing with the U.S. and other countries to secure overseas natural gas export markets. The natural gas boom has also resulted in stiffer competition in the North American market, resulting in underutilization of certain pipeline routes.

The changing supply picture is driving unprecedented growth in hydrocarbon transportation projects. Many of these projects have been framed within a nation-building context, meaning that benefits extend beyond local or regional interests.

Crude oil shipments by rail have also grown substantially over the last few years. Rail has responded rapidly to changing energy supply dynamics, resulting in new loading facilities and the manufacturing of new tank cars.⁸ While cost per distance travelled is more expensive than pipelines, rail companies are better able to respond to shifting market demands since their cargo can move virtually anywhere. In many cases, pipelines are eventually laid to reach markets largely serviced by railcars.



SAFETY AND EARNING A SOCIAL LICENSE

A social license is the broad approval by society (at the local, regional and/or national level) for a given activity or project.⁹ Earning a social license is central to transportation systems currently moving or proposing to move hydrocarbons or any other form of dangerous good.

Transparency and Dialogue

Over the last two decades, Canada's energy sector has grown steadily. This growth has been paralleled by an increase in public interest over safety and the environmental issues associated with energy production and its transport. Brenda Kenny, President and CEO of the Canadian Energy Pipeline Association, suggested that it is not enough in today's climate to obtain a regulatory license or permit in order to proceed with energy projects.¹⁰ What is needed is an understanding that public safety is much more than an engineering challenge; it also involves creating an overall sense of security and confidence in the operation of facilities and the institutions that regulate them.

To this end, a robust safety system, with a clear focus on the environment, transparency, early consultation and continued community engagement are the key elements to earning social license to build and operate energy systems. If an accident does happen, open dialogue and transparency with the communities and people affected is essential. Al Ritchie, Vice President of Operations for Spectra Energy Transmission West, told the committee, social license is based on trust. He explained: "to ensure we have that trust, we work hard to be transparent, to explain to the communities what we are doing and why we are doing it."¹¹

Earning social license can sometimes mean going beyond regulated requirements to address community concerns. A willingness to do so creates a positive environment for discussion about risks and benefits of energy projects. If an accident occurs, there must be trust that the "polluter pays" principle, a principle applied to all modes of transport, is backed by concrete action. Social license is earned when citizens have trust in emergency and spill response capabilities, based on clear plans for well-organized recovery and rehabilitation of the environment, as well as a means for compensating for damages.

Regulators are created to be independent bodies mandated to protect the public interest. In this regard, they play an important role in building public trust. Officials from the National Energy Board (NEB) told the committee that the increased media attention given to pipeline projects has moved the NEB into the public spotlight.¹² Most certainly the Lac-Mégantic disaster has made Transport Canada more visible among the public. The committee believes more can be done by our regulators to communicate details and information on the types of products released and the reasons for the incident. This data should be made available in a timely and accessible manner.

Nathan Lemphers, Senior Policy Analyst with the Pembina Institute, told the committee that he supports the idea of displaying spill information through internet-accessible interactive maps.¹³ The committee believes federal regulators such as the NEB and Transport Canada can work with stakeholders and other agencies to provide current and historical spill and accident data in an accessible manner.

Recommendation:

That the National Energy Board and Transport Canada create a web portal that includes interactive maps indicating detailed information on spills and incidents for pipelines, tankers and railcars, such as the types of product released and, as soon as possible, the cause of the incident.

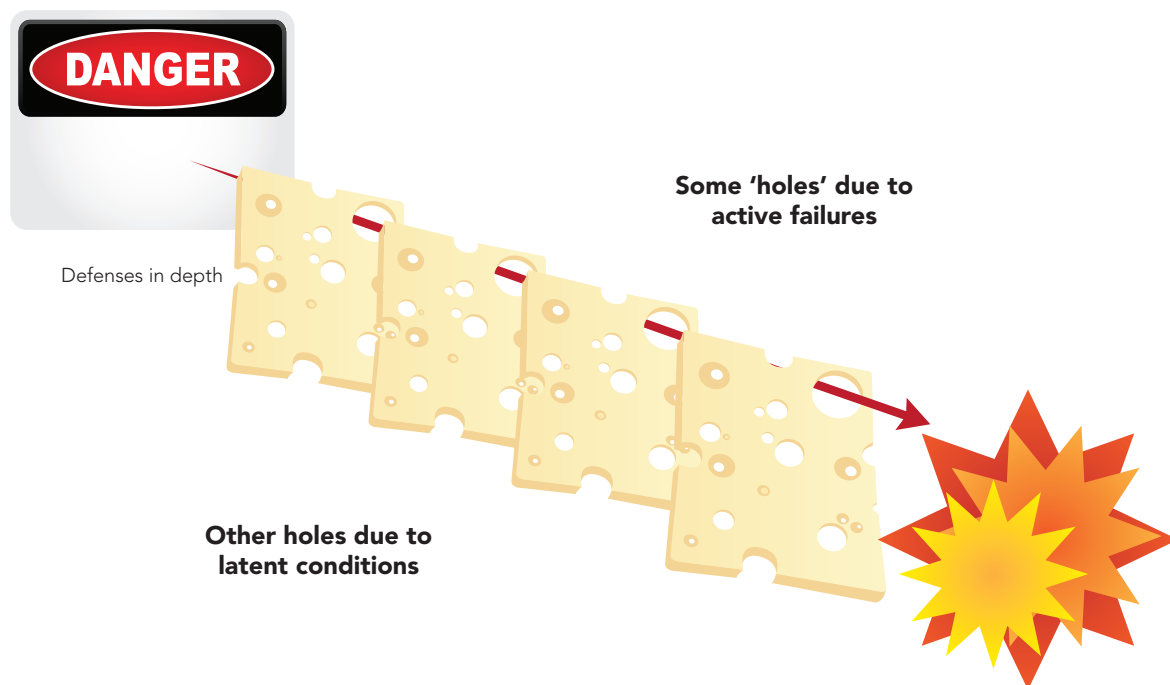


CREATING A CULTURE OF SAFETY

Companies that transport hydrocarbons are typically large organizations with many employees and operations working to transport a product that, if not managed safely, can be harmful to the public, workers and the environment.

Transportation operations, including equipment and assets, are subject to regulatory requirements, safety policies and procedures, and are all designed to prevent accidents. However, despite these safeguards, accidents still occur. The committee was told that an accident is usually caused by a series of failures. This is illustrated by the “Swiss Cheese Model” of accident causation, where defences against accidents are represented by slices of Swiss cheese.¹⁴ Defences could be a company’s safety procedures, personal safety equipment, inspection and monitoring programs, equipment standards, training, supervision, etc.

Swiss Cheese Model of Accident Causation



Source: Professor James Reason, via Professor Mark Fleming.

The holes vary in size and position and they represent the degree of weaknesses or breaches within each of the defences.¹⁵ A weakness can be an active operational failure (error) or a latent (organizational) condition such as a poor work environment, weak operating procedures, poor reporting requirements or employee fatigue. An accident occurs when all the holes momentarily line up in the presence of a threat or danger.



Understanding the nature of accidents helps transportation systems develop ways to reduce and plug holes by addressing both active failures and latent organizational weakness. The benefit of a healthy safety culture is that it impacts every one of the defences (slices of cheese) to effectively shrink the holes.

A safety culture can be defined as the shared values and beliefs that interact with an organization's structures and control systems to produce behavioural norms.¹⁶ The importance of a healthy safety culture was emphasized by many witnesses during committee hearings.

During its fact finding trip to Halifax, Nova Scotia, in May 2013, committee members met with Professor Mark Fleming of Saint Mary's University, an expert on safety culture. Professor Fleming told committee members that a healthy safety culture is at the core of better safety outcomes and is guided by the principle that every worker clearly understands that safety is the top priority. It is also embedded in an idea that safety is an approach to doing things, rather than a separate activity, thus making it part of all activities.¹⁷

Professor Fleming also cautioned that commonly used safety measurements, such as a low injury rate, are not in themselves an adequate measure of an organization's safety culture since the focus is limited to preventing slips and falls instead of looking at safety in a larger context, such as management systems, equipment design, preventive maintenance programs, in addition to worker safety measurements.

Gaétan Caron, Chair and CEO of the National Energy Board, underscored the importance of safety culture and particularly the role of leaders within an organization in its promotion: "the NEB is strongly promoting the notion that a safety culture becomes real if the CEO has affirmed it, keeps talking about it, walks the talk and feels it; if the employees believe that those manuals are real and that to follow them is good for them."¹⁸

Corporate leadership's role in building and maintaining a safety culture was a key topic for discussion at a Safety Forum hosted by the NEB in early June 2013.

The committee heard that a strong safety culture means that an organization has a preoccupation with failure; they investigate all lapses and encourage employees to report errors and empower them to immediately stop an operation if it is a threat to safety.¹⁹ While a culture of safety starts at the top of the organization, its strength lies at the bottom by attending to concerns of frontline employees. Employees should be encouraged to question management decisions on safety issues and be rewarded for safety improvements.

There must be an atmosphere of continuous learning and understanding of why accidents occur. Ultimately, a culture of safety reflects the quality of the workplace; if employees have high job satisfaction then there will likely be fewer accidents.²⁰



Regulating Safety Culture

Transport Canada and the NEB both emphasize the enhancement of a safety culture within the companies they regulate. Both recognize that an operator's safety management system (SMS) must be designed to promote a culture of safety. However, Transport Canada has moved further along in formalizing "safety culture" within regulated safety requirements. To this end, it has helped to establish a common definition of safety culture in collaboration with railway companies and unions.²¹

Officials from Canadian National Railway (CN) and Canadian Pacific (CP) told the committee that they audit safety culture within their organizations. Sam Berrada, General Manager, Safety and Regulatory Affairs for CN, said: "The audit approach we have taken is completely aligned with the definition of safety culture that was developed with work groups, including industry unions as well as the regulator... We audit safety culture, both objectively as well as subjectively."²²

In line with safety management systems (SMS), railway companies must routinely perform integrated audits to drive compliance.²³ Transport Canada officials perform audits of a company's SMS, including verifying that actual operations conform to the SMS.²⁴

While railway companies must perform an internal audit of their SMS to drive the overall safety culture of the company, an explicit safety culture assessment, which could include interviews and perception surveys of both management and employees, is not mandatory.²⁵

The federal government announced on April 10, 2013, updates to the *National Energy Board Onshore Pipeline Regulations* (OPR) emphasizing a culture of safety within regulated companies.²⁶ Specifically, regulations will require company leaders to foster a safety culture within their management systems. However, there is no regulated process to identify and explicitly audit for safety culture.

Recommendations:

That the National Energy Board work in partnership with regulated companies and experts in safety culture to develop a program for the mandatory auditing of safety culture.

That Transport Canada work in partnership with railway companies to make existing safety culture assessments mandatory within its audit program.



TRANSMISSION PIPELINES

Transmission pipelines are generally large diameter, high pressure pipelines that move oil and natural gas over long distances. They are responsible for moving up to 97% of daily natural gas and onshore oil production to markets in Canada and the United States.²⁷

Canada's transmission pipeline systems are largely concentrated in the Western Canadian Sedimentary Basin, which is where most of the oil and natural gas production in Canada takes place. From here, pipelines are connected to a North American grid, mostly through the Midwestern U.S. Both the oil and natural gas pipeline grids reconnect to Canada through Ontario. There is an oil pipeline that moves westward from Montreal to Sarnia. There is one natural gas pipeline system that cuts across the country above the Great Lakes. Also, oil and gas pipelines move product westward to the Greater Vancouver region. Nova Scotia's offshore natural gas production is shipped by pipeline within the province, as well as to New Brunswick and eastern U.S. markets. Montreal also receives oil through a pipeline from Portland, Maine.

Two pipeline projects are currently being proposed to move oil to the West Coast: Enbridge's Northern Gateway Project and Kinder Morgan's Trans Mountain Expansion Project. Also, there are two proposals to move western Canadian crude to eastern markets. These include TransCanada's Energy East Pipeline project which would convert natural gas pipelines to carry western Canadian crude oil to Montreal, Québec City and Saint John, New Brunswick. Additionally, Enbridge's Line 9 reversal project proposes to flow oil from Sarnia, Ontario to Montreal, Québec.

There are three new natural gas pipeline projects being proposed to move natural gas to the B.C. coast from production fields in North Eastern B.C. They are the TransCanada Coastal Gaslink, Spectra Energy and BG Group Natural Gas Transportation System, and the TransCanada Prince Rupert Gas Transmission Project.

Both federal and provincial governments have a responsibility to regulate pipeline systems. However, the focus of this report is on federally regulated transmission pipeline systems, which are pipelines that cross a provincial or international border.²⁸

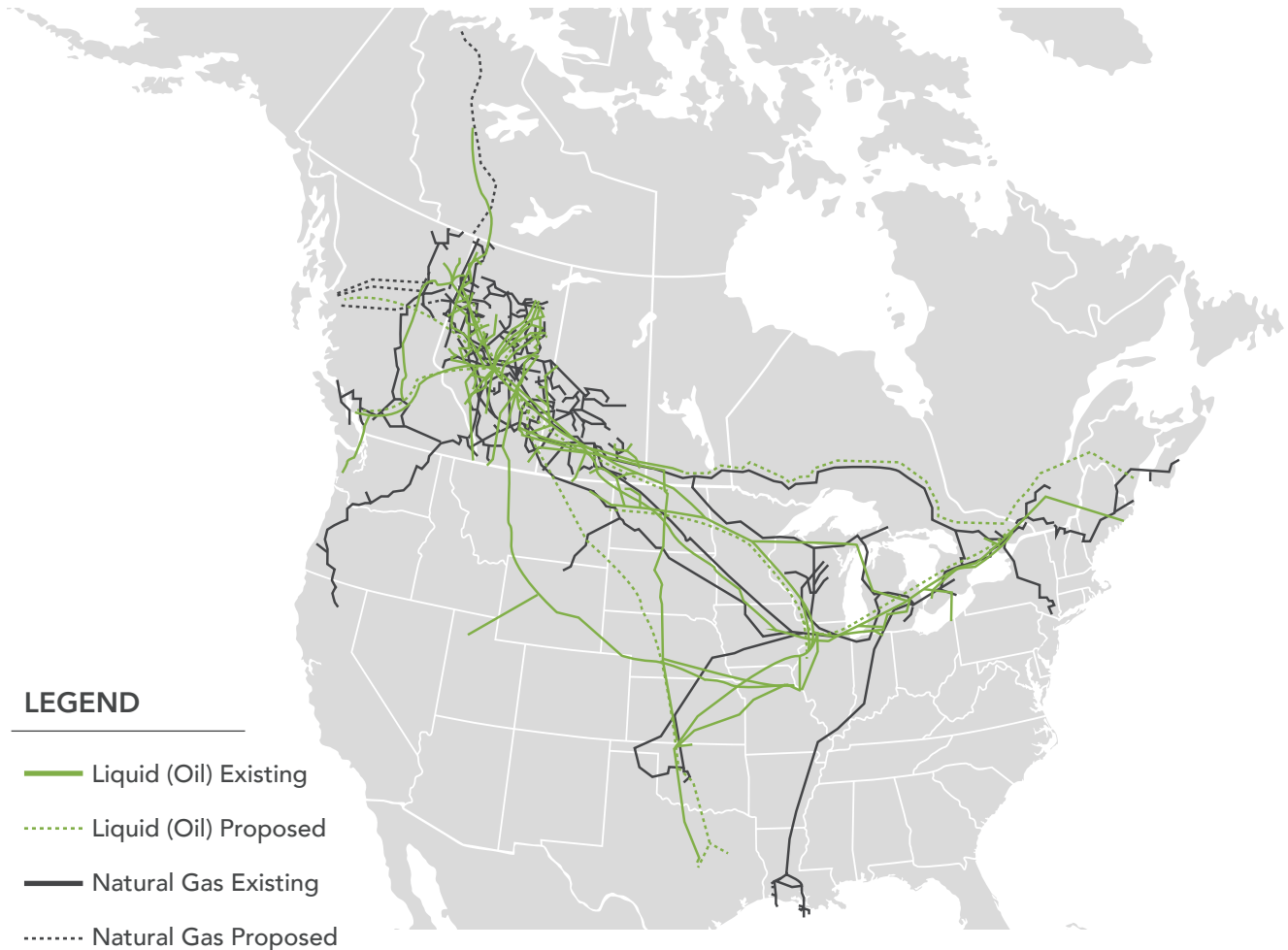
There are over 825,000 km of transmission, gathering and distribution lines that move hydrocarbons in Canada, of which 105,000 km are transmission pipelines. There are approximately 71,000 km federally regulated pipelines and most of them are transmission pipelines.²⁹



Pipeline installation – Photo courtesy of NEB



Liquid and Natural Gas Pipelines



LEGEND

- Liquid (Oil) Existing
- - - Liquid (Oil) Proposed
- Natural Gas Existing
- - - Natural Gas Proposed

Source: Canadian Energy Pipeline Association and TransCanada, map prepared by the Library of Parliament

Pipelines are divided into two major categories:³⁰

Liquid pipelines

Liquid pipelines move crude oil and other petroleum liquids across large distances using powerful pumps spaced along the pipeline. A single liquid pipeline can be used to move different batches of liquids.

Natural gas pipelines

Natural gas is moved through pipelines by large compressors, driven by large turbines similar to jet engines, placed along the pipeline.

Pipelines can be converted to transport different hydrocarbons. For example, natural gas pipelines have successfully been converted to transport crude oil, with oil pumps replacing natural gas compressors. Any conversion involves a complete revamping of the pipeline's management programs, including pipeline integrity, inspection, maintenance and emergency programs; these changes are required in order to address different risks and requirements associated with the new product.³¹



I. Pipeline Safety Statistics

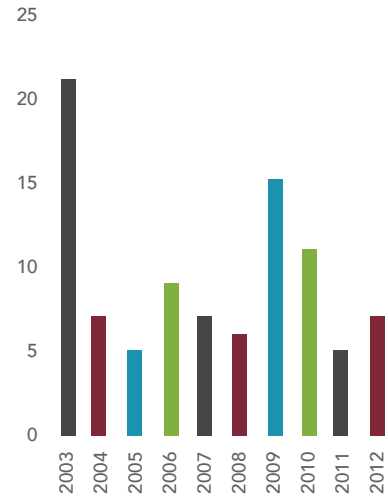
In 2012, the federally regulated pipeline system was made up of 35 companies transporting 1.2 billion barrels of crude oil per year. Fifty-eight companies, including seven that also transport oil, moved 4.5 trillion cubic feet of natural gas per year.³² Over 2000 to 2011, 99.9996% of the crude and petroleum product moved on federally regulated pipelines without a spill.³³

The Transportation Safety Board (TSB) reports pipeline accidents as those involving serious injuries, damage to the pipeline and its operating facilities.³⁴ According to the TSB, there were seven pipeline (liquid and/or natural gas) accidents in 2012.³⁵ There were no accidents on the actual pipeline; instead, the accidents occurred at supporting facilities, such as compressor stations, pump stations or meter stations. Fatal accidents are rare among pipeline systems; the last fatal accident on a federally regulated pipeline system occurred in 1988.³⁶

Over the period from 2003 to 2012, transmission pipelines represented 18% of total accidents. Compressor stations represented 27% and the remaining 55% occurred on gathering lines, meter stations and other facilities.³⁷

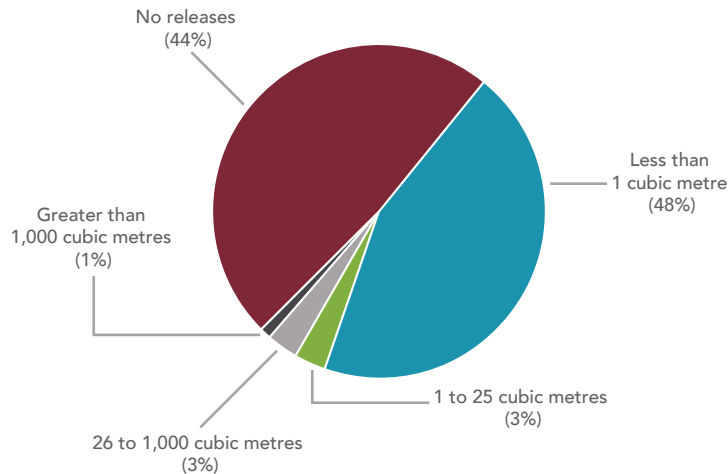
Accidents can result in the release of fuel and, while most such releases are minor, sometimes large volumes of fuel escape the pipeline system. However, between 2003 and 2012, 92% of all accidents either resulted in no releases or very minor ones. Only 1% of all accidents resulted in releases of greater than 1,000 cubic metres.³⁸

The Number of Pipeline Accidents in Canada, 2003-2012



Source: Transportation Safety Board, graph prepared by the Library of Parliament.

Percentage of Accidents by Quantity of Fuel (Oil and Natural Gas) Released, 2003–2012



Note: 1 cubic metre = 6.292 barrels of oil. Numbers do not total 100 due to rounding.
Source: Transportation Safety Board, graph prepared by the Library of Parliament.



II. Regulatory Framework

Pipeline companies are subject to various federal regulations and standards. Principally, they are the *National Energy Board Onshore Pipeline Regulations* (OPR) under the *National Energy Board Act* which set out many of the pipeline companies' responsibilities including safety, security and environmental protection.

The committee was told that the overall regulatory framework is designed to first define the desired outcomes and then allow flexibility for companies to best determine the means to achieve them. Pipeline companies support this goal-oriented approach. When compared to prescriptive approaches, it is seen as a strength since it encourages technological and process innovation to improve safety outcomes.³⁹

The process by which this approach is implemented is through a combination of management systems, mandatory operating standards, and reporting requirements. Management systems are the mechanism by which companies have flexibility to set out policies and procedures to manage safety in a way that fits their operation.

These management systems are guided and approved by the NEB. The NEB then verifies that companies have implemented and taken action as to their management systems.

III. Prevention and Standards

Accident prevention is ingrained in nearly every aspect of the pipeline system. The following section provides an overview of pipeline safety design, mechanisms and programs.

a) Safety throughout the Lifecycle

Pipelines are often described as having a lifecycle. The beginning of the lifecycle is the design stage where routes are selected to avoid environmentally sensitive areas wherever possible. The slope, soil stability and other geographic characteristics are taken into consideration because these factors may influence the design of the pipe.⁴⁰

Once manufactured to specified standards, the pipe is inspected and tested prior to shipping, and is inspected again by independent third parties after welding; cathodic protection technology is installed to prevent corrosion. The pipe is then carefully buried and the area is landscaped. The committee was told that directional drilling is often used to drill pipes below waterways. Before a pipeline is put into operation, it is pressure-tested beyond its operating design.⁴¹

Once in service, the pipeline is monitored 24 hours a day in a control centre, which is the key component of a company's supervisory control and data acquisition (SCADA) system. This is where operators monitor pipeline systems data and remotely adjust pressure along the pipeline. On March 5, 2013, committee members visited TransCanada's control room in Calgary, Alberta. Operators demonstrated how they can activate valves that are placed along the pipeline, especially near high-risk areas, to stop fuel flow in the pipe at any time. These valves are triggered automatically during emergencies.

The Myth of Bitumen Corrosiveness

Mark Corey, Assistant Deputy Minister at Natural Resources Canada, told the committee that bitumen is a lubricant and a preservative, and is no more corrosive than any other crude. This position was researched and confirmed by Alberta's Energy Regulator (AER) formerly known as Alberta's Energy Resources Conservation Board (ERCB) and Canadian Energy Pipeline Association (CEPA). Mr. Corey explained that pipelines do not typically corrode from the inside, and that the actual cause of corrosion is water. The NEB sets standards on water content in all types of crude oil. Bitumen may contain properties, such as naphthenic acids, but these are not corrosive at normal temperatures. In fact they require heat of 200° Celsius to become corrosive - a temperature that is far higher than that within the pipe.



Pipeline companies are required to adopt management systems to continuously identify, assess and address risks associated with their pipelines by taking into account factors such as a pipeline's age, integrity or proximity to waterways. The pipeline is regularly inspected by right-of-way surveillance and by in-line inspections using advanced sensing technologies; these technologies are sometimes called "smart pigs". The pipeline is sometimes uncovered for visual inspection.

Once the pipeline has reached the end of its useful life, it is typically purged, cleaned and sealed off to prevent residual fuel from entering the environment; sometimes the pipe is removed from the ground. The abandonment of a pipeline is subject to a regulated process involving pipeline companies, regulators, landowners and other stakeholders. However, landholders outlined several financial, environmental and safety concerns with the abandonment process with the committee.⁴² The committee was told that regulators and operators are working towards addressing these concerns.

As every pipeline project is different, the NEB also requires companies to fulfill commitments made during the application process, which sets out terms and conditions of approval. The NEB can submit other directives from time to time.⁴³ Also, the NEB requires companies to communicate to and to involve the public when developing projects – this often takes the form of public hearings.⁴⁴

Aboriginal consultation is a necessity for pipeline projects that might adversely impact potential or established Aboriginal Treaty rights. "The NEB requires companies to consult with potentially impacted Aboriginal groups, early in the project planning and design phases, when it is easiest for the company to respond to concerns raised by Aboriginal groups."⁴⁵

b) Canada Standards Association CSA Z662 Standard

The OPR require that pipelines be designed, constructed, operated, tested and abandoned in accordance with the Canada Standards Association's CSA Z662, "Oil and Gas Pipeline Systems" standard. This standard sets out many of the minimum requirements for pipeline systems.⁴⁶ The committee heard from Alberta's Energy Regulator (AER), formerly known as the ERCB, that the CSA Z662 standard was world-leading, a sentiment that was echoed by many other witnesses including CEPA and the Canadian Welding Bureau.

The CSA Z662 standard is continuously reviewed and revised by technical committees to keep it current with emerging technologies. Laura Pelan, Manager at the Canadian Standards Association, said that the CSA Z662 is a made-in-Canada standard, designed for the Canadian climate and geographic conditions, including northern regions of the country.⁴⁷



Pipeline control room - Photo courtesy of Enbridge



Pipeline systems in the Northern or Arctic regions must be designed to operate in severe environmental conditions, and with a shifting geography, that is subject to permafrost. Colder temperatures dictate the design features of pumping or compressor stations and the pipe that can be used and emergency response programs.

c) Compliance

The NEB uses a risk-informed approach to implement its compliance verification activities. In particular, it evaluates regulated companies and their assets to determine the most effective way to verify compliance.⁴⁸

The NEB identifies the potential risk to people and to the environment based on pipeline location, type, age and operating history. It also reviews the company's compliance record. Based on these and other factors, the NEB focuses its verification activities on the areas of highest risk, to achieve maximum impact.

The NEB has many compliance tools, including audits of management systems and programs and procedures. NEB officials also perform on-site inspections throughout the life of the project. Other compliance measures include verifying company manuals and report reviews, compliance meetings, emergency response exercise evaluations and reviews of emergency procedures manuals.⁴⁹

The NEB has the authority to shut down a pipeline if a regulated company is non-compliant. Enforcement rarely escalates to this point. Typically, the NEB orders a reduction in pipeline pressure or issues a "stop construction" order until corrective action is taken.⁵⁰

Fines and consequences for non-compliance with regulations depend on the degree of violation. Penalties include fines ranging from \$100,000 to \$1,000,000 and imprisonment from one year to five years for violations of specific provisions of the NEB Act.⁵¹

New administrative penalties came into force July 3, 2013, which gave the NEB authority to impose administrative monetary penalties of \$25,000 for individuals and \$100,000 for companies for each day an infraction is not addressed.⁵²

d) Whistle Blower Hotline

The committee heard testimony from Evan Vokes, a professional metallurgical engineer and former employee of TransCanada, who raised concerns to the NEB about specific areas of TransCanada's non-compliance with NEB standards and regulations.⁵³

The NEB found that many of Mr. Vokes' allegations of regulatory non-compliance practices were verified by TransCanada's own internal audit which was submitted to the NEB on July 18, 2012. The NEB stated that these incidents of non-compliance did not pose an immediate threat to the public or to the environment, and that TransCanada had taken steps to address and remediate the non-compliance issues.⁵⁴ However, NEB officials told the committee they also decided to advance a previously scheduled audit of TransCanada to include the specific concerns raised by Mr. Vokes.⁵⁵



In-line inspection tool - Photo courtesy of TransCanada



NEB officials told the committee that it was the actions of Mr. Vokes and other individuals that helped the NEB identify the need for a 24-hour whistle blower hotline. This hotline (1-855-465-6306), through which reports can be made by mail, phone or email, is designed to protect and facilitate anonymous disclosure by pipeline employees and the public.⁵⁶ The committee supports this initiative, which is aimed at protecting workers, public safety and the environment.

e) Third-Party Damage and One-Call

Witnesses stated that the leading cause of pipeline failure in populated areas is the inadvertent striking of a pipeline by excavators.⁵⁷ These accidents pose a risk to people, property and the environment, and can be reduced through effective awareness programs.

Most provinces have a “call-before-you-dig” program or a one-call system for those planning any construction or excavation. Jim Tweedie, Chair of the Canadian Common Ground Alliance, which is an alliance of underground gas, cable, water, electricity and telecommunications infrastructure operators, told the committee that more can be done to prevent third-party accidents.⁵⁸ The Canadian Common Ground Alliance is working on a number of initiatives including:

- 1) establishing one Canada-wide point of contact, accessible by a single phone number, the web or an app, that excavators can use to locate utilities before excavation begins;
- 2) supporting a one-call centre access in each province, through which the location of all buried infrastructure is quickly provided upon request; and
- 3) supporting mandatory “call-before-you-dig” legislation, with clear enforcement provisions including penalties.

While the committee understands that these programs fall under provincial jurisdiction, it believes the country would benefit from a national “call-before-you-dig” program. This would help to protect and landowners and excavators. It would be aligned with the U.S., which already has a mandatory national 8-1-1 number with corresponding legislation implemented at the State level.

In June 2013, the federal government announced measures to clarify rules surrounding “safety zones” where people are not allowed to dig/build along federally regulated pipelines without contacting the pipeline operator. In the same announcement, the government expressed a willingness to work with the provinces to align federal and provincial restricted zones. The committee fully supports these initiatives.⁵⁹

Recommendation:

That the federal government facilitate efforts to establish a national access point for information on the location of buried infrastructure, as well as the promotion of one-call centres and call-before-you-dig initiatives. Information on the coordinates of underground infrastructure should be consulted prior to any excavation activities by a third party.



IV. Spill and Emergency Response

In the event of a spill, pipeline operators must immediately notify the NEB. Operators are responsible for taking immediate steps to stop, mitigate and clean up a spill.

By regulation, every pipeline company is required to submit Emergency Response Plans (ERPs) on a facility-by-facility basis and the ERPs must be approved by the NEB.⁶⁰ These plans require companies to assess the risk of a spill and outline the details of a response. They must be up-to-date with corresponding emergency manuals and must be reviewed regularly. On June 26, 2013, the federal government announced that it would require ERPs to be more accessible to the public.⁶¹

Following the containment of the spill, the contaminated soil and water is removed for treatment. A process is set in place where operators must assess the environmental harm of a spill and submit plans for remediation. The NEB must approve the remediation before the site is considered clean.⁶²

Pipeline operators are required to have first-responders under contract - this is entirely funded by the operator. The committee heard that operators meet regularly with fire, police and ambulance officials to ensure procedures, practices and plans are communicated to stakeholder communities.⁶³

Pipeline companies form mutual aid agreements to assist each other when spills occur. These agreements, and the respective roles of the company, responders and government agencies, are regularly tested through emergency response exercises.

In Alberta and in parts of B.C. and Saskatchewan, a spill response cooperative called the Western Canadian Spill Services (WCSS) provides spill preparedness and response services for members which are primarily upstream petroleum companies but also includes pipelines companies. If pipeline companies are not members of the WCSS, they secure spill response capacity internally and form agreements with other spill response providers.

There are four certified marine response organizations in Canada: the Western Canada Marine Response Corporation (WCMRC), Eastern Canada Response Corporation (ECRC), Point Tupper Marine Services Ltd. (PTMS) and the Atlantic Emergency Response Team (ALERT). They are capable of responding to marine spills from land-based sources.

a) Liability and Compensation for Accidents

The *National Energy Board Onshore Pipeline Regulations* under the *National Energy Board Act* require pipeline operators to have sufficient financial resources in place to operate pipelines in a manner that ensures, among other things, the safety of people, security of the pipeline, and protection of property and the environment. This means that before being granted permission to build and operate a pipeline, operators must have the financial capacity to respond to and remedy any damage from pipeline leaks, spills and ruptures.

On June 26, 2013, the federal government announced its intention to require large companies operating major crude oil pipelines to have a minimum of \$1 billion in financial capacity.⁶⁴ A lower limit will be applied to smaller pipelines. Companies will need to have money on hand in the form of insurance, third-party guarantees, lines of credit or other approved sources.



TANKERS

Tankers have made crude oil the most traded commodity in the world.⁶⁵ These vessels ship crude and other petroleum products on a daily basis to nearly every port around the world. In Canada, tankers are our link to overseas markets and suppliers. Each year, about 80 million tonnes (586.4 million barrels) of oil are shipped off Canada’s eastern and western coasts.⁶⁶

Roughly 90% of all tanker movements, mainly from overseas, occur in Québec and the Atlantic provinces.⁶⁷ On this point, the committee was reminded that tankers have transported crude and other petroleum products from Canada’s largest refinery located in Saint John, New Brunswick, since the 1960s. More recently, liquefied natural gas (LNG) tankers have been entering the Bay of Fundy to unload at Canada’s only LNG regasification plant near Saint John, New Brunswick. Ontario refineries receive a mixture of domestically produced and imported crude, some of which arrives via tankers through the St. Lawrence Seaway.

On the West Coast, crude is moved via pipeline from Alberta to the Westridge Marine Terminal in the metro Vancouver area. From there, oil is shipped by tankers mainly to U.S. destinations and along the B.C. coast. U.S. oil tankers also traverse a small portion of Canadian waters through the Strait of Juan de Fuca as they transit between Valdez, Alaska and Washington State.



Canaport LNG ship and terminal – Photo courtesy of Canaport LNG

Major Tanker Routes





While the West Coast has comparably less tanker traffic than the East Coast, it has greater potential for growth. A number of proposed projects, if approved, would lead to an increase in movement and size of tankers off the B.C. coast. These projects include LNG shipping terminals in both Kitimat and Prince Rupert, B.C.,⁶⁸ and a terminal facility in Kitimat to ship crude oil and to receive condensate as part of the Enbridge Northern Gateway Project. Also, expanded shipping capacity is being proposed for Kinder Morgan's Westridge oil terminal in Burnaby, B.C.

In order to address future needs, including expected growth in export transportation, the federal government announced, on March 18, 2013, an initiative to create a "world-class tanker safety system".⁶⁹ This initiative includes legislative changes and the following suite of measures:

- An increase in the number of tanker inspections;
- Expansion of the National Aerial Surveillance Program;
- Establishment of a Canadian Coast Guard Incident Command System;
- Review of existing pilotage and tug escort requirements;
- An increase in the number of ports designated for traffic control measures, starting with Kitimat, B.C.;
- Scientific research on non-conventional petroleum products, such as diluted bitumen, to enhance understanding of these substances and how they behave when released in a marine environment;
- New and modified aids to navigation including buoys, lights and other devices to warn of obstructions and to mark the location of preferred shipping routes; and
- Enhancement of Canada's current navigation system.

The initiative also resulted in the creation of the Tanker Safety Expert Panel. The panel is mandated to undertake a pan-Canadian review of Canada's Marine Oil Spill Preparedness and Response Regime.

The panel is meeting with key stakeholders and has commissioned an evidence-based risk assessment of the likelihood and consequences of oil or hazardous and noxious substance spills in Canadian waters.⁷⁰ The panel will prepare two reports with recommendations for the Minister of Transport: the first report – expected to be released by November 2013 – will address the current regime south of 60°N latitude; the second report will address issues specific to areas north of 60°N latitude.

Tankers and Ports

Tankers are a safe and effective means of moving crude in large quantities around the world.⁷¹ Their design has improved substantially over the years. Today, they are technically advanced vessels with sophisticated navigation systems built and certified to international standards. LNG tankers carry natural gas in liquid form to allow increased volume of transport. The natural gas is chilled to -160° C in a liquefaction plant before being transferred to the tanker.

There are various classes of tankers, including Panamax, Aframax, Suez-Max and increase in size to very large crude carriers (VLCC). The largest tankers are called ultra-large crude carriers (ULCC); which can span nearly half a kilometre in length and are among the biggest ships ever built. As the names suggest, certain tankers were designed to pass through critical trading canals.



Tanker Type



Note: 1 tonne equals 7.33 barrels/Dead Weight Tonne (DWT) is the sum of how much a ship can carry including cargo, ballast, crew, etc.

Source: Shipping Federation of Canada, graph prepared by the Library of Parliament.

Canadian shipping terminals can accommodate different sized tankers. Aframax tankers are the largest vessels moving through the port of Vancouver. Montreal and Québec City can accommodate up to Panamax and Seuz-Max tankers, respectively, while larger sized tankers are able to dock at major ports in Atlantic Canada. Smaller tankers, sometimes called Seawaymax, are able to fit through the canal locks of the St. Lawrence Seaway linking the Great Lakes to the Atlantic Ocean.

Maximum Tanker size	Major Ports/Terminals
Seawaymax	St. Lawrence Seaway
Panamax	Montreal, QC
Aframax	Vancouver, BC
Suez-Max	Québec City, QC
VLCC	Come by Chance, NL; Halifax, NS
ULCC	Saint John, NB; Port Hawkesbury, NS

Source: Shipping Federation of Canada.

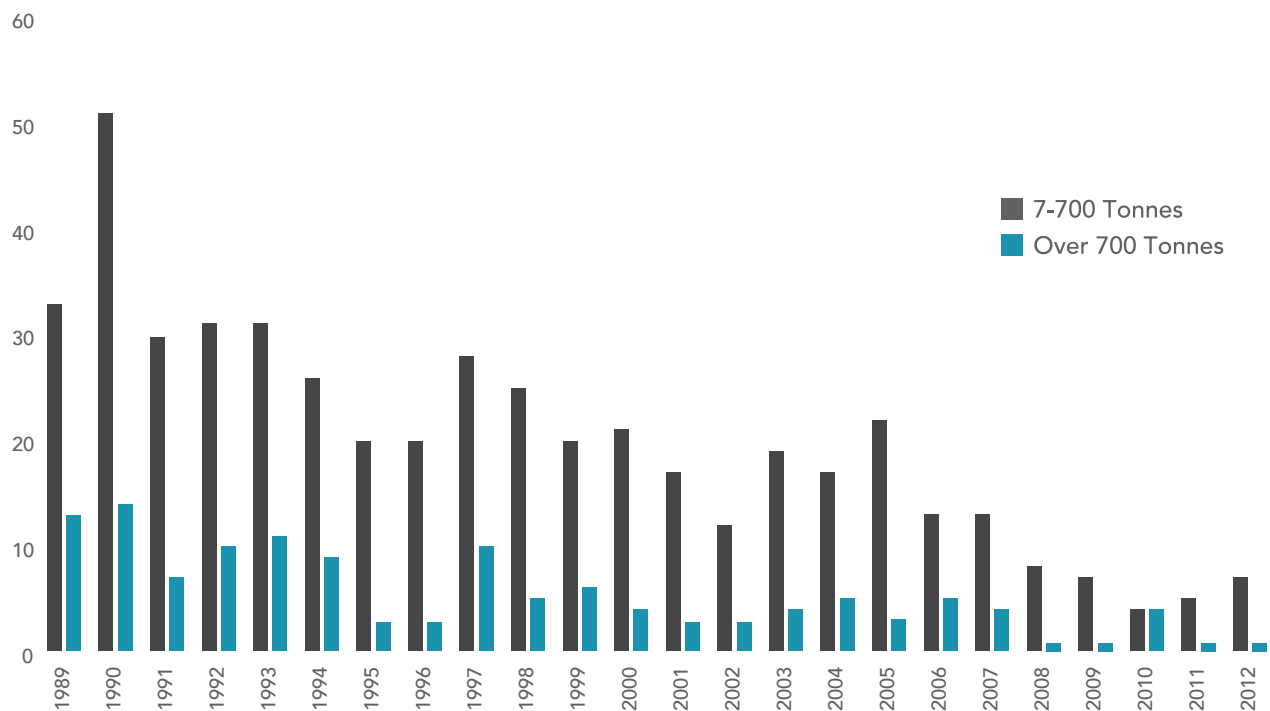


I. Tanker Spill Statistics

Ship-source spills can have a lasting impact on marine life and on the communities and livelihoods of those living along affected coastal regions. Fortunately, large spills are rare. Gerard McDonald, Assistant Deputy Minister of Safety and Security for Transport Canada, told the committee that there have been no major tanker spills in Canada for over 30 years.⁷² Captain Kevin Obermeyer, President and CEO of the Pacific Pilotage Authority Canada (PPAC) told the committee, “We are extremely proud of our safety record and regularly exceed a 99.9% success ratio.”⁷³

Globally, the number of tanker oil spills involving more than seven tonnes from tankers has steadily decreased over the last two decades, even as the world’s seaborne oil trade has been increasing.⁷⁴ International data for spills of less than seven tonnes are considered unreliable.

Number of Tanker Spills; Global



Note: 1 tonne equals 7.33 barrels

Source: International Tanker Owners Pollution Federation Limited.

Improvements in spill performance worldwide were due in part to the hard lessons learned from major disasters of the past. The grounding of the *Exxon Valdez* in March 1989 and its release of 44,000 tonnes of oil (about one-fifth of its cargo) off the coast of Alaska had a profound impact on the shipping industry and led to many improvements in tanker safety.⁷⁵ Following the disaster, the Canadian government established the Public Review Panel on Tanker Safety and Marine Spills Response Capability (Brander-Smith Panel) to undertake a major public review of tanker safety and marine spill response. That review, and the panel’s report, resulted in a significantly revamped marine spill prevention, preparedness and response approach for Canada.⁷⁶



Canadian Coast Guard (CCG) officials pointed out that there were 2,304 oil or chemical spills from vessels in 2010 and 2011, of which only 2% were attributable to tankers. Other vessels responsible for spills included pleasure crafts, fishing boats, barges and other commercial vessels. When asked about the volume of spills, a CCG representative said that most of the discharges during this time period were small, and that the CCG does not track the volumes of small spills.⁷⁷

The last major spill in Canada occurred in connection with the sinking of the Queen of the North, a ferry vessel, in 2006 off the coast of British Columbia. It spilled 240 tonnes of oil.⁷⁸

Major Spills in Canada

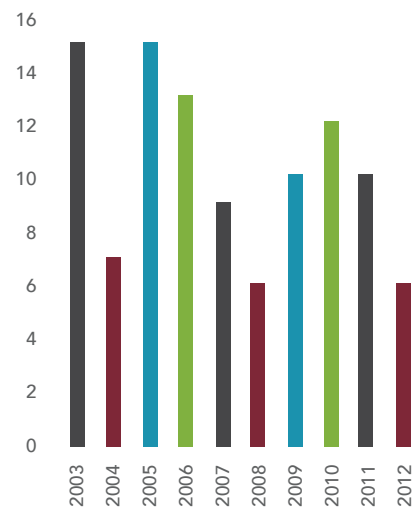
Year	Ship	Location	Spill size in tonnes
1970	Arrow (tanker)	Nova Scotia	10,000
1974	Golden Robin (tanker)	Baie-des-Chaleurs, Québec	400
1979	Kurdistan (tanker)	Cabot Strait, Nova Scotia	8,000
1988	Odyssey (tanker)	700 nautical miles off the coast of Nova Scotia	132,000
1988	Nestucca (barge)	British Columbia	1,000
2006	Queen of the North (ferry)	British Columbia	240

Note: 1 tonne equals 7.33 barrels

Source: Commissioner of the Environment and Sustainable Development.

The TSB defines reportable marine accidents as those accidents that result in a person being seriously injured or killed, a ship sinking, foundering or capsizing, being involved in a collision (including strikings and contacts), sustaining a fire or an explosion, going aground, sustaining damage that affects its seaworthiness, and including missing or abandoned.⁷⁹ In 2012, there were six tanker accidents in Canada. Between 1998 and 2012, there was one tanker-related fatality, which occurred in 2006.

Canada: Number of Tanker Accidents



Source: Transportation Safety Board, Graph prepared by the Library of Parliament.



TSB officials told the committee that it recognizes a need to modernize its marine database on spills. It is looking into methods to avoid duplication with other agencies and to lessen the reporting burden on the industry.⁸⁰

II. Regulatory Framework

Transport Canada is the regulator for marine transportation in Canada. Through its regulations and programs, it advances tanker safety and works with other departments and agencies to prevent and reduce ship-source marine pollution and its impact on the environment.

The main pieces of legislation that set out the framework for marine safety are the *Canada Shipping Act, 2001* and the *Arctic Waters Pollution Protection Act*. The rules and regulations of these Acts apply to all vessels, both domestic and foreign, in Canadian waters.

Tankers by their very nature are international in scope. They travel in international waters and dock in ports around the world. Accordingly, shipping nations have adopted multi-national frameworks, treaties and conventions aimed at harmonizing standards for tanker construction and operation, as well as safety requirements. This is done through the International Maritime Organization (IMO), a specialized agency of the United Nations. The *Canada Shipping Act, 2001* and the *Canada Labour Code* function to meet Canada's commitments under these conventions and agreements.

There are numerous IMO conventions regulating marine safety, but the most notable are:

- *International Convention for the Prevention of Pollution from Ships* (MARPOL);
- *International Convention for the Safety of Life at Sea* (SOLAS); and
- *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers* (STCW).

All oil tankers, gas carriers and other large cargo vessels must comply with an International Safety Management (ISM) Code; this is a requirement outlined in the *Safety Management Regulations* under the *Canada Shipping Act, 2001*.⁸¹ This means that ships must develop a safety management system that prevents and responds to spills and other emergencies. The system requires regular internal audits and safety management reviews, and it is subject to Transport Canada inspection.

III. Prevention and Standards

Safety in marine transportation is protected through a multi-layered system involving many components such as the ship, equipment, crew, ship management and operations, inspections and enforcement, marine communication and services, tugs, local pilotage programs and icebreaking services.⁸² There are also safety systems including response equipment and personnel at both load and discharge ports.

The following sections outline some of the major standards and prevention-related features that the committee heard about during the course of its study.

Recommendation:

That the Transportation Safety Board expand and modernize its database to provide detailed information on ship-sourced spills, including the type of ship and the volume and type of product released.

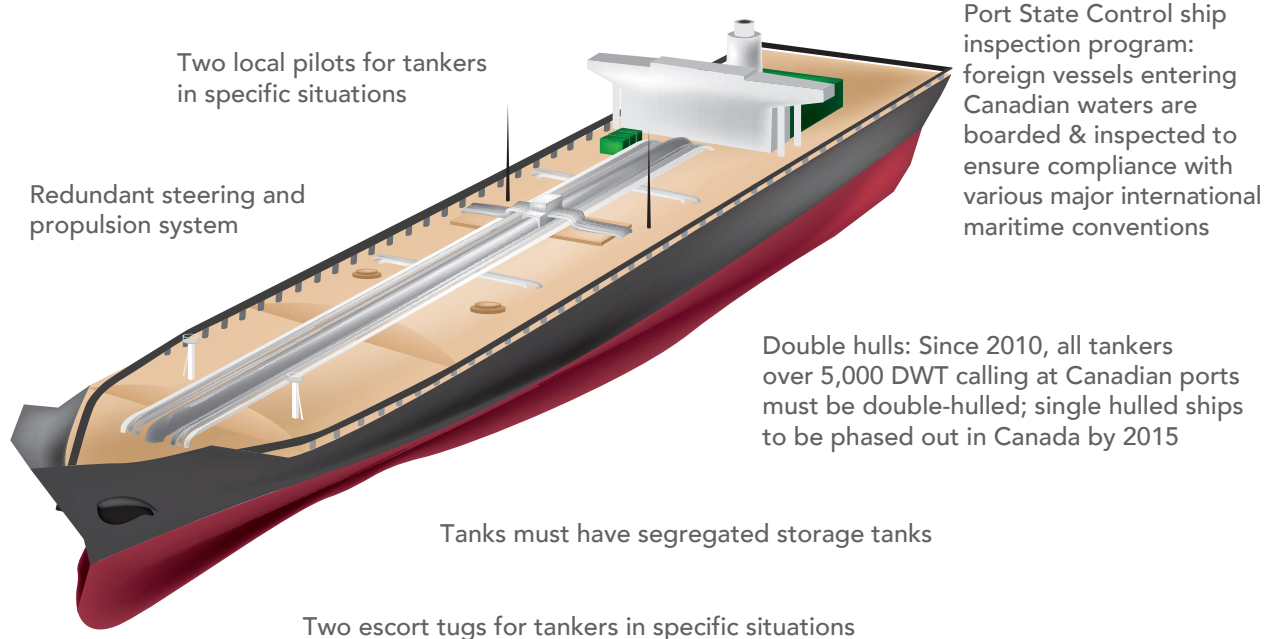


a) Tanker Design

Tankers are unlike most cargo vessels; the volume and combustible nature of the product, together with the size and design of these vessels, mean that there are many special features in the construction, maintenance, safety and emergency preparedness requirements that are unique to these ships.⁸³

Under MARPOL and the *Canada Shipping Act, 2001*, large crude oil tankers operating in Canadian waters are required to be double-hulled. This means that the bottom and sides of tankers have two complete layers that are watertight.⁸⁴ The double-hull design offers protection in the event of a collision or grounding. Since 2010, large tankers, those above 5,000 DWT, have been required to have double hulls. All smaller tankers will require double hulls starting in 2015. Oil tankers carry their cargo in several separate storage tanks, to prevent the entire load from spilling if ruptured.

Tanker Spill Prevention Features



b) Inspections

Vessels must be registered with a state; typically called flag states. Flag states are responsible for ensuring that the tanker is built to minimum standards set out by the IMO. Canadian flagged vessels are inspected by either Transport Canada inspectors or a recognized organization.⁸⁵ Recognized organizations are classification societies, which are non-government entities that establish technical, construction and operation standards for ships; which have been in existence for over 250 years.



A country into which a foreign vessel is entering has the right to inspect ships to ensure they comply with international conventions; this procedure is called Port State Control. Canada's Port State Control program requires all foreign tankers to be inspected on their first visit to Canada and every year thereafter. Gerard McDonald, Assistant Deputy Minister of Safety and Security for Transport Canada, told the committee that if a ship fails to meet any of the standards, it is not allowed to leave port.⁸⁶ Also, agreements are in place to share inspection data with other countries. In Seattle, Washington, on July 16, 2013, officials from the senior U.S. Coast Guard told members of the committee that this system is effective in weeding out the sub-standard ships worldwide.

According to Transport Canada's Port State Control Annual Report 2011, there were 1,033 vessel inspections; 35% (358) of which were tankers. Among the total of 34 vessels detained, only two were tankers: one oil tanker and one chemical tanker.⁸⁷

c) Mandatory Pilotage Zones and Escort Tugs

Tankers are not permitted to move through Canadian harbours or designated waterways without a professional pilot (in some cases two pilots are required) who has extensive knowledge of the local navigation route, including currents, subsurface features and marine infrastructure. Local pilots board tankers to guide them to their destinations safely. There are four pilotage authorities in Canada: the Atlantic Pilotage Authority, the Great Lakes Pilotage Authority, the Pacific Pilotage Authority and the Laurentian Pilotage Authority.

Captain Kevin Obermeyer, President and Chief Executive Officer of the Pacific Pilotage Authority, informed the committee that a pilot is necessary within two miles of any points of major land. His summary account of the process is set out below:

Half an hour before she arrives, our launch goes out. The pilot will be on board the launch. The first thing the pilot does as he is going out is to look at the ship from a condition perspective. Does it look like it is well maintained? Is it rusted and weather beaten? They also check what the draft is as the vessel approaches the launch. He then climbs up the pilot ladder, and if the pilot ladder is not in very good condition, all of these are keys to the pilot to be aware that things may not be as good as he thinks they are. He then gets to the bridge, introduces himself to the captain and does what we call a bridge resource management meeting. At that meeting, he will ask for confirmation that the equipment on the ship is working and in good order, that he can get emergency full astern when he needs it. Once all of that has been agreed to and he explains what course they will take and the passage and the transit to the master, the vessel carries on toward Vancouver.⁸⁸



Tanker approaching the Westridge Marine Terminal in Burnaby, BC - Photo courtesy of Kinder Morgan Canada

Loaded tankers must be escorted by tugs through designated Canadian waters. The number of tugs required depends on specific circumstances and the requirements of a regional or local port authority.



d) Surveillance from the Sky

Transport Canada aircraft regularly survey Canadian waters to detect pollution from ships. This program deters ships from discharging oil in Canadian waters. Ships that do discharge oil may be prosecuted and can face financial penalties of more than \$100,000. Gerald McDonald of Transport Canada described the precision of the air surveillance program: “We have a very sophisticated surveillance mechanism, so sophisticated that we can detect as little as a litre of oil up to 25 kilometres on either side of the plane.”⁸⁹ On March 18, 2013, the federal government announced an expansion of the program.

IV. Spill Preparedness and Response

Spills on water can pose a high ecological risk. The moving nature of waterways typically makes water-based spills more difficult and costly to contain and clean up than land-based spills. Accordingly, extensive systems are in place to prepare for, and respond to, marine spills.

Canada’s strategy to deal with ship-source oil spills is called Canada’s Marine Oil Spill Preparedness and Response Regime. It was developed in the mid-1990s based on a private-public partnership model.⁹⁰

Under this strategy, the industry funds and manages spill response operations while Transport Canada regulates, monitors and enforces the industry’s responsibilities. The Canadian Coast Guard (CCG) ensures an appropriate response is undertaken. The CCG has authority to take the lead as the on-scene commander during a spill. Environment Canada is called upon for scientific support for pollution response.

The regime is applied differently for regions south of 60° N latitude and north of 60° N latitude. Currently, there is no prescribed industry-funded response capacity for waters north of 60° N latitude. Instead, the CCG has limited response equipment depots in the Arctic to maintain response capability.

For waters south of 60° N latitude, the industry is required to maintain a preparedness capacity to respond to spills of up to 10,000 tonnes of oil from ships, or certain oil handling facilities, within prescribed timeframes and operating environments.⁹¹



Boom being deployed - Photo courtesy of WCMRC



Drum skimmer deployment exercise - Photo courtesy of ECRC



Spill response is based on a tiered structure and is provided by four Transport Canada certified response organizations (ROs): Western Canada Marine Response Corporation (WCMRC), Eastern Canada Response Corporation (ECRC), Point Tupper Marine Services Ltd. (PTMS) and the Atlantic Emergency Response Team (ALERT).

ROs are funded by the shipping industry through levies. In order to retain its certification, ROs are required to maintain response capacity within specific response times that vary depending on the size and location of the spill. Specifically, there are three designated areas: 1) Inside Port Boundary; 2) Inside Primary Area of Response (PAR) and Enhanced Response Area (ERA); and 3) Outside PAR/ERA. These areas are explicitly set out in Schedule I of the Response Organizations Standards for each region. The Port Boundary is an area immediately surrounding a designated port. The PAR extends beyond the Port Boundary, typically where shipping lanes converge, and the ERA extends beyond the PAR but is still considered a high risk area.

**Tiered Response Capabilities
(Equipment Deployed/Delivered)**

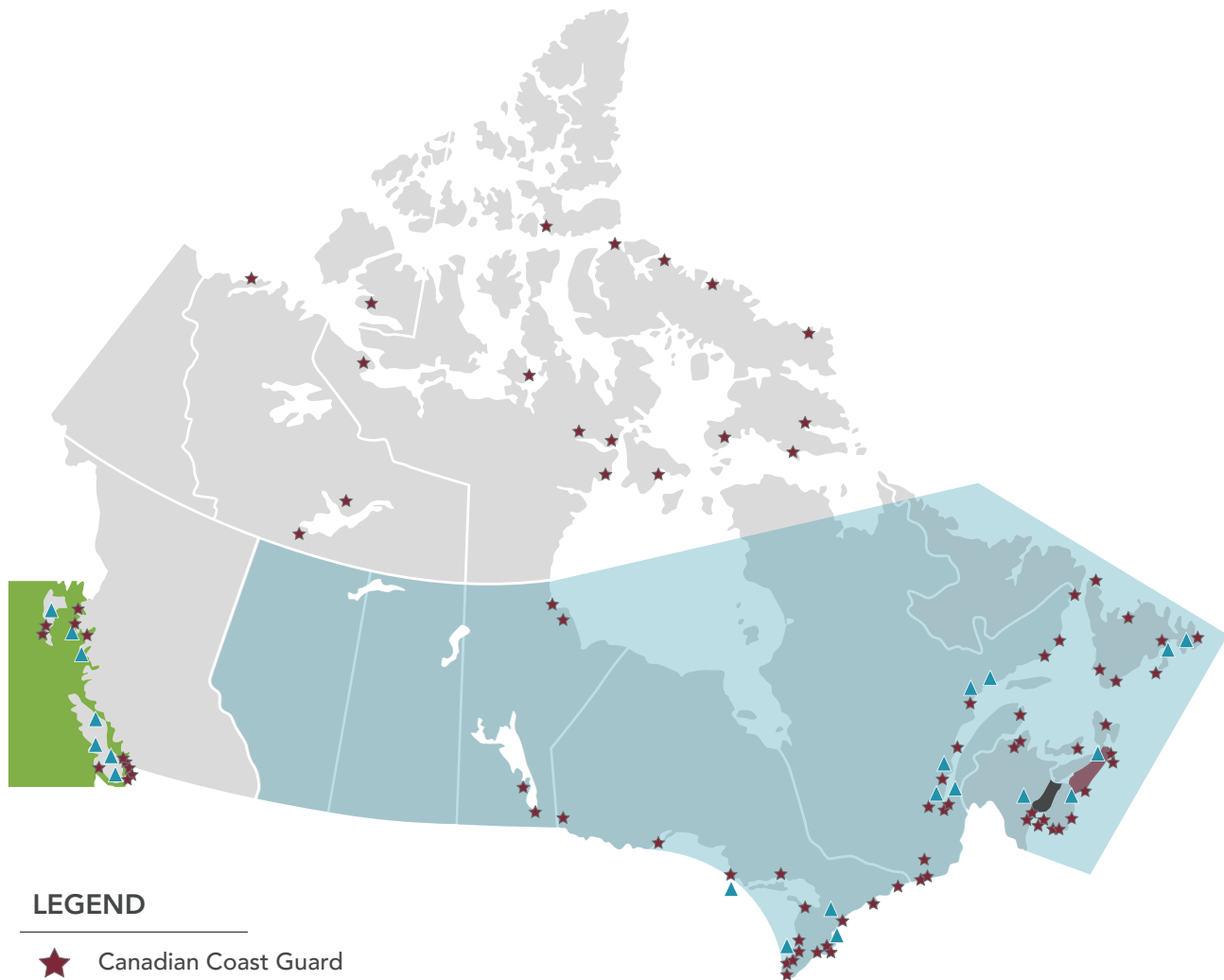
	Tier 1 (150 tonne)	Tier 2 (1,000 tonne)	Tier 3 (2,500 tonne)	Tier 4 (10,000 tonne)
Inside Port Boundary	Deployed on-scene 6 hours	Deployed on-scene 12 Hours	Delivered on-scene 18 hours	Delivered on-scene 72 hours
Inside PAR/ERA	Delivered on-scene 18 hours	Delivered on-scene 18 hours	Delivered on-scene 18 hours	Delivered on-scene 72 hours
Outside PAR/ERA	Delivered on-scene 18 hours + travel time	Delivered on-scene 18 hours + travel time	Delivered on-scene 18 hours + travel time	Delivered on-scene 72 hours + travel time

*Note: PAR: Primary Area of Response; ERA: Enhanced Response Area
Source: Western Canadian Marine Response Corporation*

Resources can be supplemented from different regions to assist in a spill, and there are also agreements of mutual assistance with international partners. ROs own vessels, employ trained personnel and store specialized equipment in strategically placed depots. ROs also contract other vessels and personnel to assist in spill preparedness and spill response. Under the *Canada Shipping Act, 2001*, tankers are required to have emergency plans and response equipment as well as trained personnel on board.



Marine Spills Response Depots



LEGEND

- ★ Canadian Coast Guard
- ▲ Marine Response Corporations
- Eastern Canada Response Corporation
- Point Tupper Marine Services
- Atlantic Emergency Response Team
- Western Canada Marine Response Corporation

Source: Canadian Coast Guard, map prepared by the Library of Parliament

The committee heard concerns from witnesses who believe that the prescribed “10,000 tonne one-size-fits-all approach” for all regions of the country is not an appropriate model for current or future needs. Kevin Gardner, President and General Manager of the WCMRC, told the committee that the WCMRC’s current capacity of 26,000 tonnes far exceeds the 10,000 tonne amount. He also suggested that spill response capacity should be reconsidered to fit the needs of different regions.⁹²



The committee believes that a spill response regime should be designed to address worst-case scenarios and meet the expectations of the public. The committee heard that risk models for the Northern Gateway project estimate a worst-case scenario of two ruptured cargo tanks on a VLCC sized tanker holding up to 36,000 tonnes of oil.⁹³ This exceeds the existing spill response capacity on the West Coast.

In July 2013, committee members visited Valdez, Alaska, and met the U.S. Coast Guard, first responders and the tanker operator in the region. Committee members were impressed by the extensive regional spill prevention, preparedness and response programs. The region is supported by the Ship Escort/Response Vessel System (SERVS) which was created after the *Exxon Valdez* accident to prevent oil spills and provide oil spill response and preparedness capabilities. SERVS maintains a readiness to respond to a nearly 41,000 tonne oil spill within 72 hours.⁹⁴ Projects like the Northern Gateway could learn and adopt the best practices of the Alaskan spill response program.

a) Responder Immunity

ROs have been asked to respond to non-ship sourced spills such as pipeline spills and derailments in waterways. Mr. Gardner raised concerns with the committee about the lack of responder immunity when responding to spills beyond that authorized by the *Canada Shipping Act, 2001*:

*We will be able to respond to oil-handling facilities, rail, pipeline, truck rollovers, and take advantage of the equipment and the personnel who are trained and multi-purpose them. Right now we get responder immunity, an indemnity clause in the Canada Shipping Act to protect us when a ship is part of the incident. However, under any other circumstance, we do not get that responder immunity.*⁹⁵

Responder immunity protects the responder from being sued for third-party damages caused by the response effort. The federal government announced that it intends to expand immunity protection under the *Canada Shipping Act, 2001* for Canadian response organizations that respond to spills involving oil-handling facilities and for foreign response organizations.⁹⁶ However, this announced expansion of immunity protection does not include pipeline, train or truck spills.

b) Canadian Coast Guard

The Canadian Coast Guard (CCG) has response depots throughout Canada's major waterways, both south and north of 60° N latitude. Some witnesses were concerned with the CCG's ability to respond to spills. Kevin Gardner told the committee that "when the regime was built back in 1995, the response organizations across Canada were to be certified for 10,000 tonnes and were to be supplemented by the Canadian Coast Guard, which was to have a 25,000-tonne capacity. I do not believe that is in place today."⁹⁷

The committee recognizes that the CCG's spill preparedness and response capabilities and operations are under review and will likely be reformed subsequent to the Tanker Safety Expert Panel's recommendations. However, based on witness testimony, the committee is concerned about the CCG's existing spill response capabilities, especially since the CCG is the principal response agency for spills in Canada's North and Arctic regions. These regions are ecologically fragile and will likely open up to shipping routes in the future.

Recommendation:

That the current spill preparedness and response capacity of 10,000 tonnes within prescribed timeframes be adjusted upwards to fit the assessed needs of each region as determined by Transport Canada.

Recommendation:

That the federal government provide umbrella responder immunity protection to Canadian marine response organizations for all non-ship source spills including marine spills from pipelines, trains and trucks.



In order to maintain its certified status, a spill response organization must prove every three years to Transport Canada that it has the capability to respond to various spill circumstances. The committee believes that the CCG should be subject to a similar certifying process.

In the event of a spill, the ship’s owner/manager, otherwise known as the Responsible Party (RP), is in charge. The RO assists the RP when needed. The RP is responsible for providing the CCG with an acceptable plan of action. If an RP is unidentified, unable, or unwilling to conduct an effective response operation, the CCG will exercise its authority, and take over managing the response.

Recommendation:

That the Canadian Coast Guard’s mandated spill preparedness and response capabilities be certified by Transport Canada or an arm’s-length agency periodically.

CCG Emergency Response

Pollutant Source	Canadian Coast Guard Role	Comment
Vessel in Canadian waters	On-Scene Commander	When the polluter is unknown, unwilling or unable to respond
	Federal Monitoring Officer	When the polluter has been identified, is able and willing to respond
Unknown source in Canadian waters (mystery spill)	On-Scene Commander	
Oil handling facility	On-Scene Commander or Federal Monitoring Officer	Only when a vessel is attached and transfer of oil is underway
Any source originating in foreign waters that enters Canadian waters	On-Scene Commander	For operations within Canadian waters
	Resource Agency	Upon request, for operations within foreign waters
Any source originating in Canadian waters that enters foreign waters	On-Scene Commander	For operations within Canadian waters
	Resource Agency	Upon request, for operations within foreign waters

Source: Canadian Coast Guard.

Committee members heard presentations from the U.S. Coast Guard and the WCMRC that strongly endorsed an incident command/unified command approach to emergency response management. Incident command is a commonly used standardized on-scene incident management system built on a flexible, expandable and interchangeable organizational structure.⁹⁸ One of its advantages is that it allows responders from different jurisdictions (for example, the U.S.) who share the same structure to quickly adapt, assess and assist during an incident. Unified command is a decision making mechanism designed to support collaboration and information sharing among multiple agencies during an incident.

The committee endorses the federal government’s announcement on March 18, 2013, that the CCG establish an incident command system. The CCG should be the federal incident commander within a unified command structure.



c) Net Environmental Benefit

Committee members found that the spill responder community in Vancouver, British Columbia, Seattle, Washington, and Valdez, Alaska, strongly endorsed a principle of net environmental benefit when it comes to spill response. That is, the final environmental outcome should be the determining factor when choosing among appropriate response strategies. For example, the use of dispersants and controlled burning in selected circumstances has many advantages in reducing the net environmental harm of a spill. It can prevent long-term environmental damage and costly remediation along shorelines.

A common concern is that the decision making process to use these techniques is sometimes cumbersome given the short window of opportunity to respond to a spill. The committee believes that Canada's response agencies should have more flexibility when choosing tools to address a spill.

Recommendation:

The committee believes that, in certain areas and under specified circumstances, certified marine response organizations should be pre-approved to use dispersant, initiate controlled burning and take other prescribed counter-measures when it yields a net environmental benefit.

d) Liability and Compensation for Oil Spills

Canada's oil pollution liability and compensation program is based on a "polluter pays" principle and is set out in the *Marine Liability Act*. This Act implements several international conventions which require ship owners to hold insurance in an amount that is linked to the tonnage of the vessel. These international conventions also limit or cap the liability of ship owners and specify the amounts that must be made available for clean-up, compensation and to address natural resource damages. If the cost of damages exceeds a ship owner's liability, international and domestic funds provide additional amounts to a maximum total of approximately \$1.36 billion.⁹⁹ This funding to pay for clean-up costs is multi-tiered.¹⁰⁰

- The first tier, as required under the IMO's *International Convention on Civil Liability for Oil Pollution Damage*, 1969 (the Civil Liability Convention), is paid on behalf of a ship-owner by the ship's insurer or by a protection and indemnity club or association that offers insurance coverage to ship-owners and charterers against third-party liabilities. Ship-owners are strictly liable for oil pollution damage to an extent calculated according to ship tonnage but which does not exceed approximately \$145 million.
- The second tier is paid by the International Oil Pollution Compensation Fund, 1992, which provides an additional maximum amount of approximately \$180 million for a total of approximately \$325 million. This additional amount is accessible after funds in the first tier are exhausted or in instances where the ship-owner is legally exempt from liability.
- The third tier is paid by the International Oil Pollution Compensation Supplementary Fund, which provides up to an additional \$875 million, for a total of approximately \$1.2 billion. This funding can be accessed when funds from the second tier are exhausted.
- Finally, Canada has its own Ship-Source Oil Pollution Fund, a national fund which constitutes a fourth tier of funding, adding an additional tranche of up to \$160 million per incident. That makes the total of approximately \$1.36 billion for the oil pollution liability and compensation regime in Canada.

The committee was told that Transport Canada has examined the U.S. system, which includes funds accessible to the President in emergencies, as well as funds for research and development, and is evaluating the adequacy of the Ship-Source Oil Pollution Fund, based on a risk analysis.¹⁰¹



RAIL

Canada has the third largest rail network in the world and ranks fourth in the world in volume of goods transported.¹⁰² Transporting hydrocarbons is not new to rail. Canadian railways have had a long history of shipping crude, petroleum products and other dangerous goods throughout Canada and into the U.S. Over the past two years, the growth in North American oil production has created expanded commercial opportunities for rail companies.

Rail companies told the committee that rail is a complement to and not a replacement for pipelines.¹⁰³ Rail networks can move product virtually anywhere, and while it is generally more costly than pipelines to transport crude over long distances, their capacity to respond quickly with flexible cargo options is attractive to shippers looking to take advantage of changing market dynamics. Rail is also a viable economic alternative to building a pipeline, when accessing smaller or niche markets. Currently, railways are not involved in transporting natural gas, with the exception of natural gas liquids such as propane and butane.

Canada's two national railways, Canadian National Railway (CN) and Canadian Pacific (CP), operate roughly three-quarters of Canada's rail network. They are the dominant freight rail operators and link important trade corridors with the U.S. and across Canada.¹⁰⁴ Much of the remaining tracks are operated by 37 short line railways which feed and deliver cargo to and from mainline railways.¹⁰⁵

Crude shipments by rail have been rising rapidly. The Railway Association of Canada has stated that CN and CP are expected to move 140,000 carloads of crude in 2013, up substantially from 500 in 2009 in North America.¹⁰⁶ In Canada, rail crude shipments are also growing rapidly: in the third quarter of 2013 "fuel oil and crude petroleum" shipments accounted for over 8 million barrels, up from 4.8 million barrels in the first quarter of 2012.¹⁰⁷

Lac-Mégantic Disaster

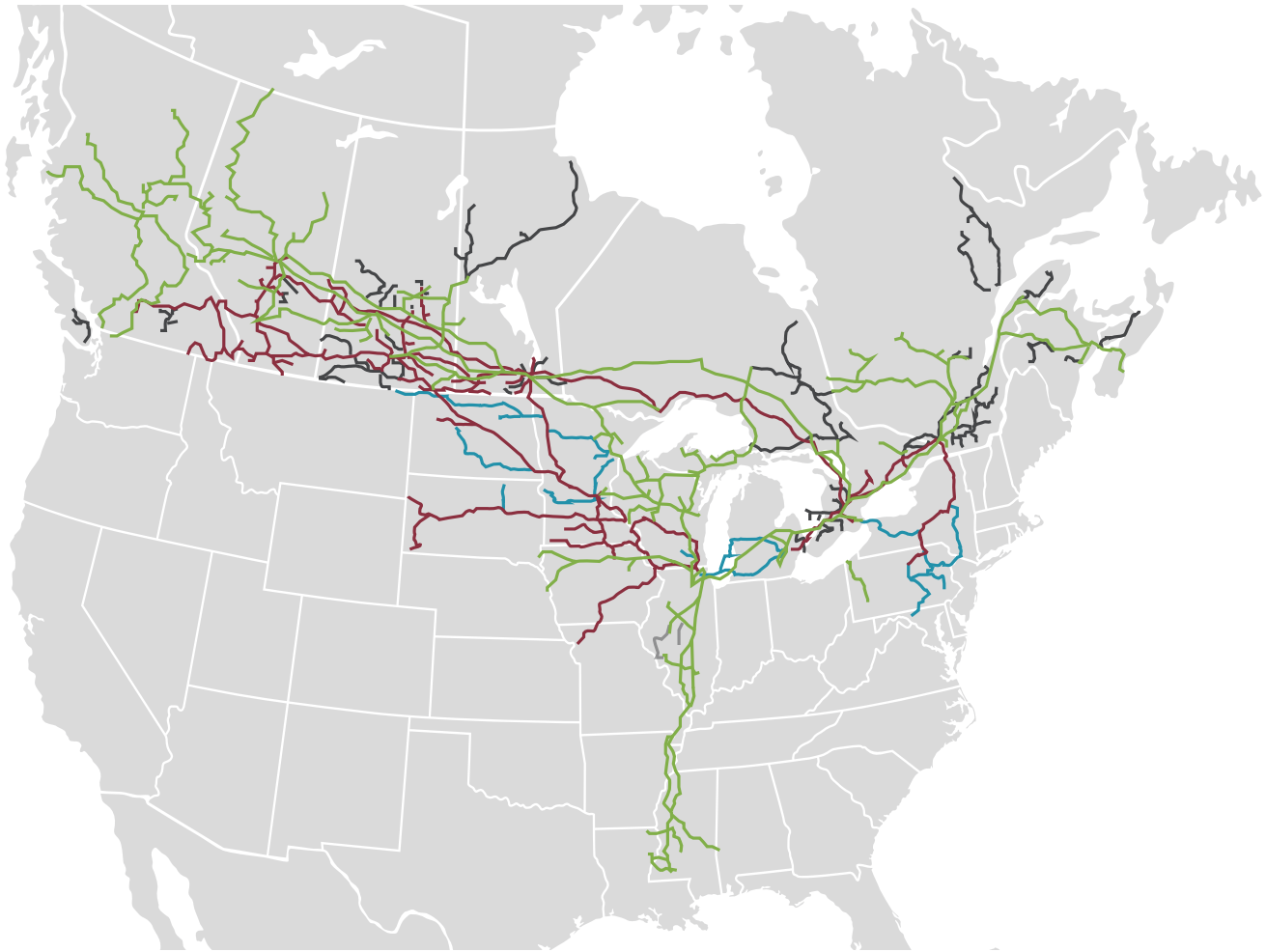
On July 6, 2013, an unattended Montreal, Maine & Atlantic (MMA) train carrying crude oil catastrophically derailed, caught fire and exploded in Lac-Mégantic, Québec. This devastating disaster caused a tragic loss of life, destroyed much of the downtown area and resulted in significant environmental harm. Due to the scope of the disaster, the committee concluded that an arm's-length review of rail safety is necessary in Canada. This review should be initiated following the Transportation Safety Board (TSB) investigation. In the meantime, the committee has provided recommendations related to tank cars, regulatory oversight of the transport of dangerous goods and liability and compensation.



CN unit train unloading - Photo courtesy of Railway Association of Canada




CN, CP and Short Line Railways



Source: Transport Canada, map prepared by the library of Parliament.

LEGEND

-  Canadian National
-  Canadian Pacific
-  Other Railways
-  CN - US Track Rights
-  CP - US Track Rights



Major Industry Safety Review

The Lac-Mégantic disaster has placed the growth in oil shipments by rail under greater scrutiny. The accident raises concerns about the adequacy of the rail industry’s safety system when transporting petroleum products and other dangerous goods.

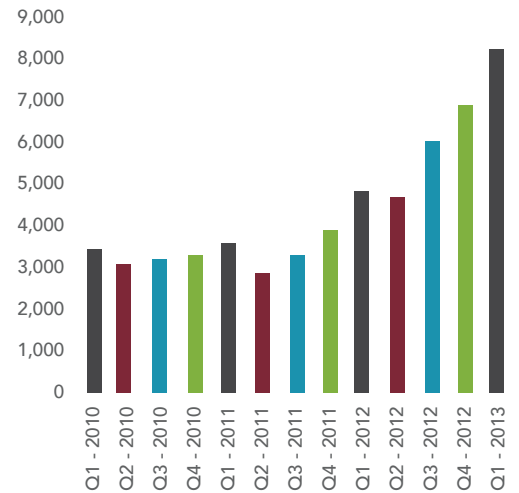
The accident is currently under investigation by the TSB. It will take some time before full results are known and made public. However, investigative details and actions are already emerging. On July 19, 2013, the TSB released two urgent Safety Advisory letters¹⁰⁸ to Transport Canada asking for reviews of the Canadian Rail Operating Rules and all railway operating procedures.¹⁰⁹

On July 23, 2013, Transport Canada responded to the TSB advisory and issued an emergency directive requiring rail operators, “effective immediately,” to:¹¹⁰

- *Ensure that no locomotive attached to one or more loaded tank cars transporting dangerous goods is operated with fewer than two qualified persons on a main track or sidings;*
- *Ensure that no locomotive attached to one or more loaded tank cars transporting dangerous goods is left unattended on a main track;*
- *Ensure, within five days of the issuance of the directive, that all unattended controlling locomotives on a main track and sidings are protected from unauthorized entry into the cab;*
- *Ensure the directional controls, commonly known as reversers, are removed from any unattended locomotives, preventing them from moving forward or backward, on a main track or sidings;*
- *Ensure that their company’s special instructions on hand brakes are applied to any locomotive attached to one or more cars that is left unattended for more than one hour on a main track or sidings;*
- *Ensure that, in addition to complying with their company’s special instructions on hand brakes referred to in the item immediately above, the automatic brake is set in full service position and the independent brake is fully applied for any locomotive attached to one or more cars that are left unattended for one hour or less on a main track or sidings.*

The committee supports the work of the TSB and Transport Canada in responding without delay to the Lac-Mégantic disaster, in order to safeguard the public, railway workers and the environment.

Canada Rail: Fuel Oil and Crude Petroleum; Barrels (Thousands)



Source: Statistics Canada (CANSIM Table 404-0002), graph prepared by the Library of Parliament.



The committee recognizes that the rail industry has improved its safety record over the last several years and that, for the most part, crude oil and other dangerous goods have been transported safely and without significant incident in Canada for many years.

However, while no activity is risk-free, and although the complete causes of this accident have yet to be determined, the massive loss of life, extensive property destruction and damage and lasting environmental harm, have convinced the committee that a major arm’s-length review of the industry’s safety regime is necessary.

The committee believes that the Lac-Mégantic tragedy could have the same impact on the rail industry as the 1989 *Exxon Valdez* spill has had on marine oil transportation. Namely, it resulted in significant changes in tanker design and a major overhaul of Canada’s marine spill preparedness and response programs.

I. Rail Safety Statistics

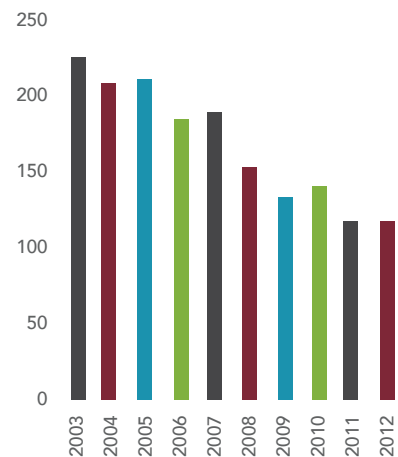
Until the Lac-Mégantic disaster, the overall safety record of cargo transportation by rail had been improving. From 2003 to 2012, train accidents in Canada declined by 25% and main track derailments decreased by 60%. Accidents involving dangerous goods have also been trending downward. In 2012, there were 118 accidents involving dangerous goods, a 48% decline from 2003.¹¹¹

In 2012, non-main track derailments and collisions accounted for 91% of all rail accidents involving dangerous goods. According to the TSB, “Typically, most non-main track accidents are minor, occurring during switching operations at speeds of less than 10 mph.”¹¹² In 2012, main track derailments accounted for 5% of total accidents with dangerous goods.

Recommendation:

That the federal government initiate a major arm’s-length review of the country’s railway regulatory framework, standards and industry practices to meaningfully advance the safe transportation of dangerous goods by rail in Canada.

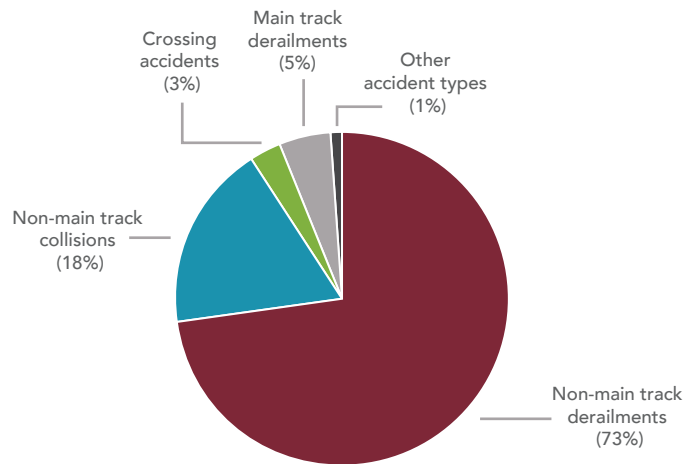
Canada: All Rail Accidents Involving Dangerous Goods



Source: Transportation Safety Board, graph prepared by the Library of Parliament.



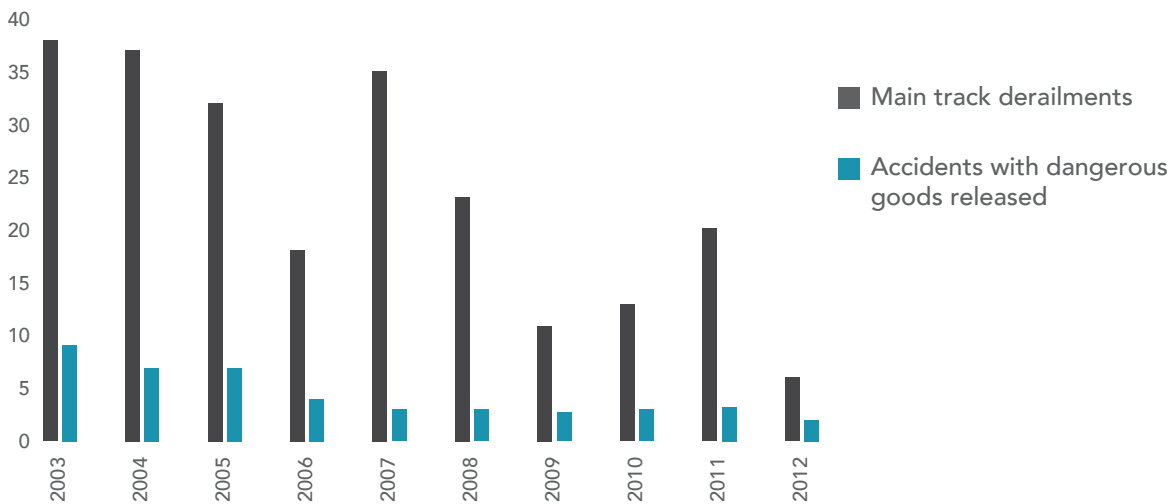
Rail Accidents Type: Dangerous Goods 2012 (Canada)



Source: Transportation Safety Board, graph prepared by the Library of Parliament.

In 2012, there were six main track derailments with dangerous goods, compared to 20 in 2011 and 38 derailments in 2003. Of the 118 main track and non-main track accidents in 2012 involving dangerous goods, there were two which resulted in the release of dangerous goods into the environment.

Rail Accidents with Dangerous Goods: Main Track Derailments and Release (Canada)



Source: Transportation Safety Board, graph prepared by the Library of Parliament.

In its published statistics, the TSB does not normally isolate the specific types of dangerous goods released. However, the TSB provided the committee with more detail on hydrocarbon spills in Canada. Between 2000 and 2012, there were 14 spills under 455 litres and 9 spills over 455 litres. Many of the small spills were minor, such as venting of gas or small leaks. There were no crude oil releases during this period. However, in 2005 there was a major release of heavy fuel oil (700,000 litres) and pole treating oil (88,000 litres) due to a main track derailment near Wabamun, Alberta.¹¹³



According to TSB reports, there are also a number of accidents resulting in fatalities every year. Most of these occurred at crossings or involved trespassers. In 2012, there were 82 fatalities, up 16% from the previous year from trains (both passenger and freight). Trespassers accounted for the larger number, 49 fatalities, while crossing fatalities accounted for 29. That year there were four rail employees that were fatally injured.

II. Regulatory Framework

The safety of railways in Canada is regulated by both federal and provincial legislation. Federally regulated railways are those that have interprovincial or Canada-U.S. operations. There are 37 Canadian railways regulated primarily through the *Railway Safety Act (RSA)* and the *Transportation of Dangerous Goods Act (TDG)*.¹¹⁴

Transport Canada is responsible for establishing the safety regime for railway operations. It has an overriding duty to protect people, property and the environment, but it is the railway companies' responsibility to ensure that their operations are safe.¹¹⁵

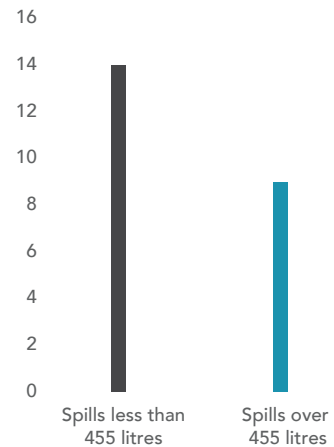
To this end, railway companies are required by law to establish safety management systems (SMS) approved and regularly audited by Transport Canada. These SMS are designed to advance safety outcomes and to promote a culture of safety. In 2010, railway companies, in collaboration with Transport Canada, railway unions and the Railway Association of Canada, adopted a common definition of safety culture for the industry and incorporated it within their respective SMS.¹¹⁶ However, as previously noted, Transport Canada does not make safety culture assessments mandatory within a railway company's SMS audit program.

The RSA establishes government regulations, rules, and standards that apply to all railway companies, but they can also be uniquely applied to a single railway company under the Canadian Rail Operating Rules. The RSA also permits the industry to develop its own rules and engineering standards in specified areas such as maintenance of railway tracks, railway equipment, security and personnel training. These rules are subject to approval by Transport Canada and can be legally recognized as equivalent to regulations.¹¹⁷

III. Prevention and Standards

The rail industry in North America is highly integrated. Railway companies operate in networks where the tracks are built to North American standard gauge and are maintained to common standards. Typically, loaded cars are pulled by a locomotive owned and operated by the track owner, but railways often hand off cars and locomotives to other railways to complete a journey.¹¹⁸

Canada: Rail Accidents with Oil and Gas Releases 2000-2012



Source: Transportation Safety Board, graph prepared by the Library of Parliament.
Note: 1 Barrel equals 159 litres



Emergency responder training for tank cars – Photo courtesy of Railway Association of Canada



Trains travel at relatively high speeds across a vast network; they regularly carry dangerous goods near communities. It is the proximity of railcar movement to people and communities that shape train safety systems.

a) Railway Monitoring

Main track collisions and derailments represent the highest form of risk to safety and the environment. In presentations to the committee, railway company officials provided examples of technologies used to test track geometry, identify rail flaws, wheel, axle or signal problems. Other examples include visual inspection and walking assessments.¹¹⁹

Railway companies told the committee that they initiate inspection programs, both in scope and frequency of inspection, beyond what is required by regulation as per their SMS. Michael Farkouh, Vice President of Safety and Sustainability at CN, said that risk assessment programs under CN's SMS allow it to go beyond minimum regulatory requirements. When asked if Transport Canada should hire more inspectors, Sam Berrada, General Manager, Safety and Regulatory Affairs of CN, said: "There is no further requirement for Transport Canada to do any more than what they currently do."¹²⁰

b) Tank Cars

Hydrocarbons are transported by rail in cylinder-shaped tanks cars. These cars are commonly categorized in two groups: 1) low-pressure tank cars that transport liquids like crude oil; 2) pressurized tank cars carrying gases in a liquid state such as propane or butane.¹²¹

Crude oil is sometimes transported by unit trains, which are like pipelines where all the tank cars are shipped as a unit to the same destination without being split up. Tank cars have specified features designed for protection in case of an accident.

Rail companies do not typically own the tank cars. Instead, they are usually owned, leased or licensed by the shipper. However, railways maintain an obligation to inspect any railroad equipment rolling on their network, including tank cars.¹²² CN officials told the committee that they have staff in various locations across their network to perform safety inspections of rail cars.¹²³

c) CTC-111A and DOT-111 Standard

The committee heard that most tank cars used to carry crude oil in Canada and the U.S. are constructed to CTC-111A or DOT-111 standards, respectively.¹²⁴ CTC-111A and DOT-111 refer to the same type of railcar specifications established under the now defunct Canadian Transportation Commission (CTC) and by the U.S. Department of Transportation (DOT).

According to the TSB, these types of tank cars "do not have head shields and are pressure-tested at relatively low pressures...they can be constructed of carbon steel, aluminum alloy, or alloy steel (stainless). They do not have protective housings to safeguard the top fittings from impact damage."¹²⁵ The TSB has had a long-standing concern with the use of these tank cars in transporting liquid dangerous goods due to a high incidence of tank integrity failures when involved in derailments.¹²⁶

Dangerous Goods on a Train

The Transportation of Dangerous Goods Act (TDG) applies to all modes of transport throughout Canada but it is particularly applicable to the rail industry since railway companies ship multiple cargoes of various dangerous goods. There are nine classes of dangerous goods under the TDG Regulations. They are classified according to the type of hazard they represent such as flash point of flammable liquids, sensitivity to explosion, toxicity and corrosiveness. Transport Canada officials told the committee that the flash point of hydrocarbons was the determining factor in it being considered a dangerous good because the heavier the oil, the less dangerous it becomes.



CP officials told the committee that the standard was revised, effective 2011, to meet increased requirements for head and shell thickness and rollover protection for top and bottom fittings on the tank car.¹²⁷ According to the Railway Freight Car Inspection & Safety Rules (TC O 0-159), which provide the standards for the design of new cars, only new tank cars are required to be designed and manufactured in accordance with the revised standard.

However, since the existing CTC-111A or DOT-111 tank cars have an average life of 40 years, the committee is concerned about the risk to the public and environment from the existing fleet in operation.

d) Compliance

Transport Canada officials explained that its inspectors verify for compliance using a risk-based process, which serves to identify problems and allocate departmental resources where they are most needed.¹²⁸ Transport Canada also investigates complaints it receives regarding unsafe conditions.

Safety audits of SMS are used to assess a railway company's safety performance. Transport Canada verifies if company operations conform to safety procedures outlined in the company's SMS.

Transport Canada safety inspectors have the authority to enter premises, seize property and question people. They can direct a company to not use the rail works or equipment.¹²⁹ Ministerial emergency directives can be issued to a single company or a whole industry, as was the case on July 23, 2013, in response to safety concerns following the Lac-Mégantic disaster.

IV. Spill Preparedness and Response

In the event of a train accident, the rail company is responsible for managing the incident. This includes assessing the hazards and scoping the nature of the response. If the accident is large, then an incident command system is put in place to organize the response. This is coordinated with various public agencies and control of the scene can vary depending on the nature of the accident.¹³⁰

In accidents involving crude oil spills or any other dangerous goods, the response is addressed through an Emergency Response Assistance Plan (ERAP) in accordance with the *Transportation of Dangerous Goods Act* (TDG). Every shipper is required to submit a Transport Canada approved ERAP with each shipment. ERAPs assist responders in the safe handling of crude oil or any other dangerous good, as well as its environmental clean-up. Rail companies also submit ERAPs specific to each train.¹³¹

The railway network is spread over a wide landscape including remote regions. The committee heard that railway companies strategically position their spill response equipment in locations that are most at risk, including near waterways or other environmentally sensitive areas.¹³² In cases where access is limited, companies work out plans to secure an appropriate response to these areas. Railway companies may also form mutual response assistance agreements.

Recommendation:

That Transport Canada review, in cooperation with the United States Department of Transportation, the use of CTC-111A and DOT-111 tank cars and consider accelerating the transition to the revised standard.



Railway companies testifying before the committee pointed out that they have a large network of first responders who receive specific training in communities throughout Canada. Glen Wilson, Vice-President of Safety, Environment and Regulatory Affairs for CP, added: “We map out our network from the standpoint of where various contracted expertise is, so we ensure that we have both contract expertise, whether it be air monitoring, water monitoring and testing and sampling, and physical equipment such as booms and pumps.”¹³³

a) Report of the Commissioner of the Environment and Sustainable Development

The committee notes that the December 2011 Report of the Commissioner of the Environment and Sustainable Development was critical of many activities relating to Transport Canada’s approach to regulating the transport of dangerous goods. It is without question that the Lac-Mégantic disaster has generated greater interest in these findings.

The Commissioner found that Transport Canada cannot ensure that sites are inspected according to the highest risk they pose or that corrective action has taken place in instances of non-compliance. Also, the Commissioner found that Transport Canada had only given temporary approval of roughly half of the ERAPs submitted. On this point, the Commissioner notes: “As a consequence, many of the most dangerous products regulated under the Act have been shipped for years without the Department having completed a detailed verification of plans for an immediate emergency response.”¹³⁴

b) Liability and Compensation for Accidents

A train company’s liability coverage to compensate for damages caused by an accident is established through the issuance of a Certificate of Fitness issued by the Canada Transportation Agency.¹³⁵ A Certificate of Fitness is required by all railways proposing to construct or operate a railway under federal jurisdiction. In order to receive a Certificate of Fitness, the Agency must be satisfied that adequate third-party liability insurance coverage is obtained for the construction or operation of the railway.

The scope of the Lac-Mégantic disaster and the reported difficulties in securing funding for loss of life and personal and property damages, as well as environmental clean-up and other liabilities underscores the need for minimum thresholds for liability coverage.

For example, on June 26, 2013, the federal government announced that the companies operating major pipelines will require a minimum of \$1 billion financial capacity in the form of bonds, lines of credit, third party guarantees or liability insurance.

Recommendation:

That Transport Canada implement all the recommendations from the December 2011 Report of the Commissioner of the Environment and Sustainable Development related to the transport of dangerous goods by rail.

Recommendation:

That Transport Canada apply appropriate minimum liability coverage thresholds to ensure rail companies have the financial capacity to cover damages caused by a major incident.



CONCLUSION

Our economy relies on the free flow of goods. Many of us take transportation systems for granted, but they are indispensable to the functioning of modern societies. As a major producer and consumer of energy, Canada exports and imports large amounts of oil and natural gas, and moves these products throughout the country in order to ensure that Canadians have reliable access to energy.

For the most part, oil and natural gas are moved safely and without incident through pipelines and by tankers and railcars. However, no activity is without risk, and hydrocarbon spills or accidents do occur. While most of these spills and incidents are minor, occasionally they can result in major disasters.

Oil and natural gas have been transported in Canada for many decades. Throughout this time there have been vast improvements in technology, regulatory oversight, and the manner in which safety and risk are managed. Equally, there have been substantial improvements in responding to and rehabilitating the effects of a spill. Each major incident, whether in Canada or beyond our borders, must be carefully examined to learn what went wrong so that steps can be taken to prevent similar accidents in the future. This is why the committee has recommended a major *arm's-length* review of safety in rail transportation.

What is key is that our transport companies foster a culture of safety throughout their operations. There must be a preoccupation with continuously improving safety outcomes. This applies to operators as well as the institutions that regulate them; this is what is necessary to earn and maintain the trust of Canadians.



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