Pipeline Performance Summary

2018 Annual Report
The BC Oil and Gas Commission (Commission) protects public safety and safeguards the environment through the sound regulation of oil, gas and geothermal activities in B.C.

From exploration through to final reclamation, the Commission works closely with communities and land owners, and confirms industry compliance with provincial legislation. It also ensures there are close working relationships; consults with, and considers the interests of Indigenous peoples.

With more than 20 years’ dedicated service, the Commission is committed to safe and responsible energy resource management for British Columbia.

For general information about the Commission, please visit www.bcogc.ca or phone 250-794-5200.

Role of the

BC OIL AND GAS COMMISSION

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The Commission’s workforce consists of over 275 employees operating out of seven locations - Fort Nelson, Fort St. John, Dawson Creek, Terrace, Prince George, Kelowna and Victoria, with the largest number of employees concentrated in Fort St. John, the heart of oil and gas activity in the province. The offices in Fort Nelson and Dawson Creek ensure the Commission’s presence in the communities of the Peace River Basin and Montney gas plays respectively.

Our vision

Safe and responsible energy resource development for British Columbia.

Our mission

We provide British Columbia with regulatory excellence in responsible energy resource development by protecting public safety, safeguarding the environment and respecting those individuals and communities who are affected.

Our values

Respect

Integrity

Transparency

Innovation

Responsiveness

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Introduction

Purpose of Report

British Columbia’s oil and gas industry depends on pipelines for the distribution of products such as natural gas, water, and oil. Pipelines are recognized as a safe and efficient mode of transportation, and secure operation is essential to protecting public safety and the environment.

This report provides a statistical overview of pipelines regulated by the Commission in the 2018 calendar year. It includes data on types of pipelines, lengths, uses, and pipeline incident rates. The multi-stage lifecycle of a pipeline is explained, and incident response protocols are outlined. It also summarizes the Integrity Management Program, a documented framework outlining the practices by which operators test and maintain pipelines to mitigate potential integrity issues.

Previous annual pipeline performance summaries can be found on the Commission’s website at https://www.bcogc.ca/publications/reports.

pipeline regulation

The Commission’s jurisdiction extends to the majority of pipelines in British Columbia, as defined in legislation by the Oil and Gas Activities Act (OGAA). Activities regulated by the Commission extend throughout the lifecycle of a pipeline, and include pre-activity consultation and notification, permitting, construction, operation, maintenance and abandonment. Pipelines not under the Commission’s jurisdiction include those crossing provincial and/or national borders and gas utility systems. CSA Z662 is a national standard developed in accordance with CSA Z662 – Oil and Gas Pipeline Systems. It is required that operators comply with other applicable regulations including the Environmental Protection and Management Regulation, Consultation and Notification Regulation, Pipeline Crossings Regulation, and Emergency Management Regulation.

The Commission is additionally responsible for provincial authorities involving the Land Act, Water Sustainability Act, and the Forest Act for pipeline right-of-ways, roads, land clearing and other minor works. The Legislation page of the Commission website provides the full list of acts and regulations governing oil and gas activities in the province.

Pipeline inventory

47,066 kilometres

The Commission’s annual Oil and Gas Reserves and Production reports continue to show an upward trend in gas production year-over-year. This upturn contributes to increased pipeline capacity requirements and a gradual rise in the total number of pipelines.

Pipelines transport a number of refined and unrefined products including natural gas, sour natural gas, liquid hydrocarbons (such as crude oil and high vapour pressure hydrocarbons), water and other miscellaneous gases and liquids. Seventy eight per cent of the pipelines regulated by the Commission transport natural gas, while approximately 11 per cent carry liquid hydrocarbons and the remainder carry water or other gases or liquids. Pipeline definitions and product classifications are available on page 14.

As shown in Table 1, the total length of pipelines in the province in 2018 regulated by the Commission is 47,066 kilometres (km). This is a net addition of approximately 1,874 km of total registered pipelines (starting operation or reactivated) over the previous year. Deactivated pipelines increased by 2,068 km while abandoned pipelines increased by 671 km. Operating pipelines in 2018 decreased by 272 km.

Table 1: Total lengths of pipelines by type and status (in kilometres)

<table>
<thead>
<tr>
<th>TYPE</th>
<th>TOTAL</th>
<th>OPERATING</th>
<th>DEACTIVATED</th>
<th>ABANDONED</th>
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<td>15,056</td>
<td>11,363</td>
<td>2,923</td>
<td>768</td>
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<tr>
<td>Water</td>
<td>4,144</td>
<td>3,516</td>
<td>372</td>
<td>256</td>
</tr>
<tr>
<td>Liquid Hydrocarbons</td>
<td>5,213</td>
<td>3,964</td>
<td>805</td>
<td>304</td>
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<tr>
<td>Other</td>
<td>823</td>
<td>558</td>
<td>214</td>
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2018 Grand Total: 47,066 km

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<td>3,846</td>
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<tr>
<td>Other</td>
<td>592</td>
<td>429</td>
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2017 Grand Total: 45,192 km

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<td>19,843</td>
<td>1,162</td>
<td>768</td>
</tr>
<tr>
<td>Sour Natural Gas</td>
<td>14,062</td>
<td>12,153</td>
<td>1,915</td>
<td>364</td>
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<td>Water</td>
<td>3,557</td>
<td>3,177</td>
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<td>Liquid Hydrocarbons</td>
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<td>3,953</td>
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<td>Other</td>
<td>348</td>
<td>287</td>
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2016 Grand Total: 44,552 km

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<tbody>
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<tr>
<td>Sour Natural Gas</td>
<td>14,032</td>
<td>12,123</td>
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<td>Water</td>
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<td>3,177</td>
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<tr>
<td>Liquid Hydrocarbons</td>
<td>4,768</td>
<td>3,904</td>
<td>557</td>
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<tr>
<td>Other</td>
<td>348</td>
<td>287</td>
<td>47</td>
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</table>
From the creation of a preliminary pipeline plan, through construction and inspections, to deactivation and abandonment, the lifecycle provided here depicts the multiple stages of a typical pipeline from initial land surveys to final site restoration.

At the onset, Commission decision makers conduct a comprehensive review of each pipeline application for engineering standards, legal requirements, and for environmental and public safety considerations. The Commission ensures proponents have conducted consultations with land owners and other rights holders on pipeline projects that will directly affect them, including the legal obligation to consult and accommodate First Nations.

If a pipeline application is approved, Commission specialists may set permit conditions as necessary to protect key environmental assets, such as water, wildlife and forest values. A significant component of the Commission’s framework for managing the impacts of oil and gas development on the environment is Area-based Analysis, described on the Commission website.

The Commission then ensures the pipeline is constructed and operated in accordance with applicable regulations, confirms thorough inspections are performed, and monitors the project throughout its lifecycle. Should any deficiencies be identified at a site, the Commission may order the operator to cease activities as necessary until appropriate actions are performed to safely resume operations.

As detailed in the Commission’s mandate, and considering the many stages of a pipeline’s lifecycle, the protection of public safety and the environment is top priority. Permit holders are required to report to the Commission before, during and upon completion of their oil and gas activities. The framework under which pipelines are operated includes such initiatives as the pipeline Integrity Management Program (IMP), designed to help prevent spills and more so to maintain pipeline integrity, which in turn prevents unintended releases. IMP’s are described on page 11.

**OIL AND GAS ACTIVITY STAGES**

1. **LAND SURVEY.** Land and airspace are measured to establish property boundaries, topography, and land features, and to develop surface maps.

2. **PIPELINE PLAN.** A preliminary pipeline plan is prepared, utilizing survey data to propose a safe, informed and responsible pipeline route.

3. **CONSULTATION AND NOTIFICATION.** Stakeholder engagement begins; the Commission is accountable for ensuring consultation is appropriate and adequate.

4. **SITE ASSESSMENT.** The pipeline route is determined, taking into account such matters as soil handling and conservation, aquifer protection, archaeological sites, and eventual site restoration considerations.

5. **PERMIT APPLICATION SUBMISSION.** Applications undergo a thorough technical screening to ensure the plans are safe and designs are compliant with regulations prior to being considered for approval.

6. **EMERGENCY PLANNING ZONES.** Are established around facilities, pipelines, and wells, and pre-determined Emergency Response Plans are created.

7. **SITE PREPARATION, CONSTRUCTION AND INSPECTION.** At any point during construction, the Commission reserves the right to inspect the construction process, watching for compliance with legislation and any permit approval conditions.

8. **EMERGENCY PLANNING ZONE.** Are established around facilities, pipelines, and wells, and pre-determined Emergency Response Plans are created.

9. **GOING LIVE.** The Commission receives notice the pipeline has been properly tested and the transporting of petroleum, natural gas, solids, water or other substances to destinations such as refineries, processing plants, or shipping points begins.

10. **SAFE PIPELINE OPERATION.** Safety considerations begin at the initial design stage and are expected to be maintained through abandonment and final restoration.

11. **INTEGRITY MANAGEMENT PROGRAM REVIEW.** During the operating life of the pipeline, the Commission will review a company’s IMP and any incidents and repairs that occur.

12. **DEACTIVATION.** The Commission evaluates deactivation requests for appropriate maintenance and monitoring measures, to prevent or minimize adverse effects while the pipeline remains idle.
INTEGRITY MANAGEMENT PROGRAM

COMPLIANCE ASSURANCE

To ensure public safety, environmental protection, and operational reliability, the Pipeline Regulation requires all pipeline operators in the province implement an Integrity Management Program (IMP). Pipeline IMP is a preventative and documented framework specifying the processes and practices used by pipeline operators to anticipate hazards, and analyze and manage risks throughout the entire lifecycle of pipelines. The IMP programs incorporate a management system approach.

As per the B.C. Pipeline Regulation, Section 7, every pipeline permit holder planning, designing, constructing, operating, maintaining or abandoning pipeline infrastructure within the province must have developed and implemented IMPs. A compliance assurance protocol is available to operators, outlining Commission expectations and operating requirements, and provides guidance for developing, implementing and maintaining effective IMPs. Details of the compliance assurance protocol and the scope of the protocol can be viewed on the Commission website. The 2017 Pipeline IMP Compliance Assurance Summary report is also on the website.

The Commission has been assessing the effectiveness of permit holders’ IMPs since 2011. The pipeline IMP compliance assurance process consists of three phases (Figure 1). The first phase is operator prioritization and selection. Selected operators are required to complete self-assessment reporting documents and submit them to the Commission within a set timeline. The second phase consists of audits involving systematic review of operator IMP processes, records and documents in order to verify compliance and generate audit findings.

The third phase allows for corrective action plans and follow-ups to address any non-compliance discovered through the audits.

During 2018, the Commission audited the IMPs of seven pipeline operators. Where non-compliances were identified, operators were required to develop and implement corrective actions to rectify the deficiencies. The Commission monitors and assesses each corrective action to ensure all findings of non-compliance are fully resolved.

The Commission will continue to undertake IMP audits for all B.C. pipeline operators, engaging with companies to improve the design, construction, operation and maintenance of pipelines, including older, legacy pipes.

AND EMERGENCY RESPONSE PROGRAMS

Emergency response programs guide the creation, management and implementation of a permit holder’s ERPs, allowing for quick access to critical information, coordination of multiple-responder activities, and identification of predetermined equipment and services available for deployment in an emergency. They equip incident responders with hands-on training and emergency response exercises, ensuring personnel understand their incident command structure, communication methods, and responsibilities in an emergency event.

The Commission’s Security and Emergency Management Branch regularly audits ERPs to ensure consistent compliance with the EMR, and oversees and may participate in permit holder emergency response exercises. Should a permit holder’s emergency protocols fail to meet requirements, the Commission may utilize compliance and enforcement actions, which may include issuing orders, penalties, or shutting-in a pipeline system.

The requirements in the EMR are designed to create a framework for the protection of the public, emergency responders, property and the environment from incidents occurring due to oil and gas activities.

Although emergency preparation, equipment and protocols help reduce the rate of incidents, the Commission strives to continually improve emergency management measures.

To coordinate and prepare for incidents in advance, permit holders must develop and maintain emergency response programs and response contingency plans (ERPs), as directed in the Emergency Management Regulation (EMR).

Emergency response programs include the creation, management and implementation of a permit holder’s ERPs, allowing for quick access to critical information, coordination of multiple-responder activities, and identification of predetermined equipment and services available for deployment in an emergency. They equip incident responders with hands-on training and emergency response exercises, ensuring personnel understand their incident command structure, communication methods, and responsibilities in an emergency event.

Figure 1 shows an overall incident frequency of 0.47 for every 1,000 km of pipelines, a decrease from 0.64 in 2017. As stated, not all incidents result in a spill or release of a product. In 2010 the implementation of OGAA led to broader reporting criteria, meaning all incidents – including those that have the potential to affect the integrity of a pipeline but did not cause spillage – must be reported.
An incident is defined as a present or imminent event or circumstance, resulting from an oil and gas activity that is outside the scope of normal operations, and may or may not be an emergency. Operators must communicate all reportable incidents to the Commission. Non-minor incidents must be reported immediately (within one hour), and minor incidents must be reported within 24 hours. The Commission’s Incident Classification Matrix outlines spill reporting criteria, and how incident levels are assessed, determined and reported.

Any person aware spillage is occurring, or believes there is the potential for spillage, can provide assistance by calling the operating company indicated on the on-site signage and identifying the location of the pipeline, or by calling the Commission’s 24/7 emergency number at 1-800-663-3456. The Commission responds to all incidents, establishing communication with the operator, confirming the incident level, and assessing the operator’s response. Commission staff further determine what remedial actions must be taken, whether a pipeline can continue to operate safely, and whether compliance or enforcement actions are required. Subsequent incident investigations allow the Commission to confirm the cause and any contributing factors, and whether repairs or solutions should be broadly communicated to all other operators to prevent similar incidents from occurring. Investigations may also be triggered by public enquiries and incidents reported to the Commission.

Post-incident reports must be submitted by the operator within 60 days identifying the root cause of the failure and any repair methods, operational changes, or design modifications that may be required.

The number of reported incidents in 2018 was 0.47 per every 1,000 km of pipeline.
RELEASING AND SPILLS

2018 STATISTICS
In terms of incidents that involved a release or spill, Table 2 shows sour natural gas pipelines had the lowest incident rate with a frequency of 0.07 per 1,000 kilometres. Pipelines conveying product labeled as “Other” transport miscellaneous liquids or gases, and had four release incidents. This category can also include service liquids and gases such as water/methanol mix and inert nitrogen gas.

In the event of a pipeline gas release or liquid spill, the Commission ensures complete clean up and remediation assessment and cleanup. After the failure point was exposed, cut out, and a failure analysis was performed, the pipeline and producing wells. The cause of failure was found to be internal corrosion. An environmental assessment company was contracted to assist with the assessment and cleanup. After the failure point was isolated and the valve was replaced. The rest of the pigging barrel was examined for other leak points.

The largest liquid spill from a pipeline in 2018 was 10 m³ release of sour natural gas on Crown land outside the pipeline was removed from service. It was replaced. The rest of the pigging barrel was examined for other leak points.

The largest gas release from a pipeline in 2018 was a 500 m³ release of sour natural gas on Crow land outside of Fort Nelson by July Lake. The cause of the incident was a failed one-inch valve on a pig receiver (maintenance device) leading to the release of gas. Upon detection of the gas release, the pig barrel was isolated and the valve was replaced. The rest of the pigging barrel was examined for other leak points.

Table 3 shows metal loss (corrosion) was the leading cause of pipeline incidents in 2018, contributing to 10 incidents. External interference was the second leading cause of failures contributing to nine incidents. The interactive web-based BCOGC Incident Map provides the location of pipeline incidents dating back to 2009. It includes data on pipeline spills, releases, and damage to active and discontinued pipelines, including the status of incidents.

INCIDENT CAUSES

Table 2 shows the number of incidents involving a release or spill per 1,000 km of pipeline by type of pipeline in 2018.

Table 3: Classification of Pipeline Failures

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<td>26</td>
<td>45</td>
<td>42</td>
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*All four incident incidents were reversals.
PIPELINES DEFINED

PIPELINE: pipelines regulated by the Commission are defined in OGAA (except in Section 9) as piping through which any of the following is conveyed or transported:

• Petroleum or natural gas.
• Water produced in relation to the production of petroleum or natural gas, or conveyed to or from a facility for disposal into a pool or storage reservoir.
• Solids.
• Substances prescribed under Section 133(2)(v) of the Petroleum and Natural Gas Act.
• Other prescribed substances.

The scope of the definition also includes installations and facilities associated with the piping, but does not include:

• Piping used to transmit natural gas at less than 700 kilopascals (kPa) to consumers by a gas utility as defined in the Gas Utility Act.
• A well head.
• Anything else that is prescribed.

CRUDE OIL: crude oil, sour crude and low-vapour pressure hydrocarbons.

LIQUEFIED NATURAL GAS: natural gas in its liquid form, achieved through cooling. The cooling process can reduce the volume of gas by 600 times, allowing for efficient transport. Includes sweet gas and fuel gas.

NATURAL GAS: includes natural gas, sweet gas, and fuel gas. Consisting mostly of methane, natural gas is a colourless, odourless, flammable gaseous hydrocarbon.

OTHER: miscellaneous gases and liquids, condensate and oil emulsion/effluent.

SOUR NATURAL GAS: natural gas with a hydrogen sulphide (H2S) partial pressure greater than 0.3 kilopascals.

HIGH-VAPOUR PRESSURE (HVP) HYDROCARBONS: examples include ethylene, propane, pentanes and liquid ethane. These products can quickly convert to gaseous form at atmospheric pressure.

INCIDENT: for the purposes of this report, a present or imminent event or circumstance, resulting from an oil and gas activity that is outside the scope of normal operations, and may or may not be an emergency.

LOW-VAPOUR PRESSURE (LVP) HYDROCARBONS: these products flow through pipelines in liquid or quasi-liquid form at a lower pressure than HVP hydrocarbons. Examples include oil, heavy oil, and synthetic oil.

m³: a measure of volume - cubic metre; 1m x 1m x 1m; 1,000 litres.

PIPELINE PERMIT: a permit that includes permission to construct, maintain, and operate a pipeline.

SHUT-IN: the isolation or closure of a well zone, a pipeline or a facility. For example, the temporary shut-in of a well allows for the analysis of such factors as a well’s productive capacity, pressure, and permeability.

SPILL: as defined in OGAA, petroleum, natural gas, oil, solids or other substances escaping, leaking, or spilling from a pipeline, well, shot hole, flow line, or facility (or any source apparently associated with any of these substances).

WATER: freshwater, produced water, salt water and sour water.