

Chapter 5

Regulating Pipelines

1.0 MAIN POINTS

The Ministry of Energy and Resources (Energy and Resources) is responsible for regulating pipeline construction and operations in the province. Industry continues to invest heavily in Saskatchewan's crude oil and natural gas resources. Pipelines are used to transport oil and gas to market. The crude oil and natural gas industries generated \$1.7 billion in revenues for the province in 2010-11 as compared to \$0.7 billion in 2001-02.

Our audit concluded that for the year ended October 31, 2011, the Ministry did not have effective processes to ensure full compliance with *The Pipelines Act, 1998* and *The Pipelines Regulations, 2000*. There are requirements under this legislation that are not being acted upon. Failure to regulate pipelines effectively could harm people or the environment.

To improve its processes the Ministry needs to:

- › Develop written policies and procedures to guide staff when assessing pipeline design, monitoring pipeline construction, and evaluating pipeline operations
- › Consistently document its assessments of pipeline license applications for compliance with the law prior to issuing pipeline licenses
- › Implement a risk-based assessment approach to monitor pipeline construction and verify pressure tests
- › Monitor pipeline operator compliance with integrity management and safety processes for existing pipelines
- › Assess the resources it requires to fulfill its legislative mandate and responsibilities under *The Pipelines Act, 1998*

Energy and Resources regulates oil and natural gas from wellheads and related sites under *The Oil and Gas Conservation Act* and related regulations. This legislation requires Energy and Resources to ensure any spills from wellheads and related sites are appropriately remediated. However the legislation does not apply to spills from pipelines that are reported in accordance with *The Pipelines Regulations, 2000*. The Ministry told us that when it becomes aware of spills, it checks to confirm that pipeline operators clean up contaminated sites. We recommend that the Ministry of Energy and Resources consider seeking responsibility in law to verify that pipeline operators clean up contaminated sites to an acceptable condition.

The law currently exempts Energy and Resources from regulating the construction of flowlines in the province. Flowlines are generally smaller and shorter pipelines that connect a wellhead to a storage or other facility. Flowlines pose the same type of environmental risks as larger pipelines but are located by the wellhead. Energy and Resources estimates there are currently 68,000 flowlines with an additional 3,000 to



4,000 being built annually. We recommend that Energy and Resources consider seeking responsibility in law to license flowlines.

2.0 INTRODUCTION

Energy and Resources works to achieve sustainable development of Saskatchewan's diverse energy, mineral and forestry resources, including oil, natural gas, potash and uranium.¹ *The Pipelines Act, 1998* and *The Pipelines Regulations, 2000* require Energy and Resources to regulate the construction, operation and abandonment of oil, natural gas and other pipelines.

Energy and Resources currently regulates more than 1,700 licensed pipelines and 300 allowed by permit² and exempted³ pipelines. These pipelines span 23,500 km in length. In 2001-02, Energy and Resources had 1,380 licensed pipelines and 300 allowed by permit and exempted pipelines that spanned 20,500 km in length. Energy and Resources is also responsible for approximately 68,000 flowlines.⁴ Per Energy and Resources, one quarter of all licensed pipelines are over forty years old.

Energy and Resources is not responsible for pipelines that cross national or provincial borders. These pipelines are the responsibility of the National Energy Board.

The oil and natural gas industry is expanding in the province. Figure 1 shows the increasing number of actively producing wells over the last ten years. Saskatchewan set a new record for the number of horizontal oil wells drilled in 2010.

The Government collects significant revenues from the production and sale of crude oil and natural gas. As Figure 2 shows, in 2010-11, the province collected over \$1.7 billion in revenues from these resources. Most of this production flows through pipelines in Saskatchewan.

It is important that Energy and Resources have effective processes to ensure compliance with *The Pipelines Act, 1998* and *The Pipelines Regulations, 2000* to ensure it meets its responsibility in law and acts to reduce the risk of the occurrence of pipeline and flowline spills.

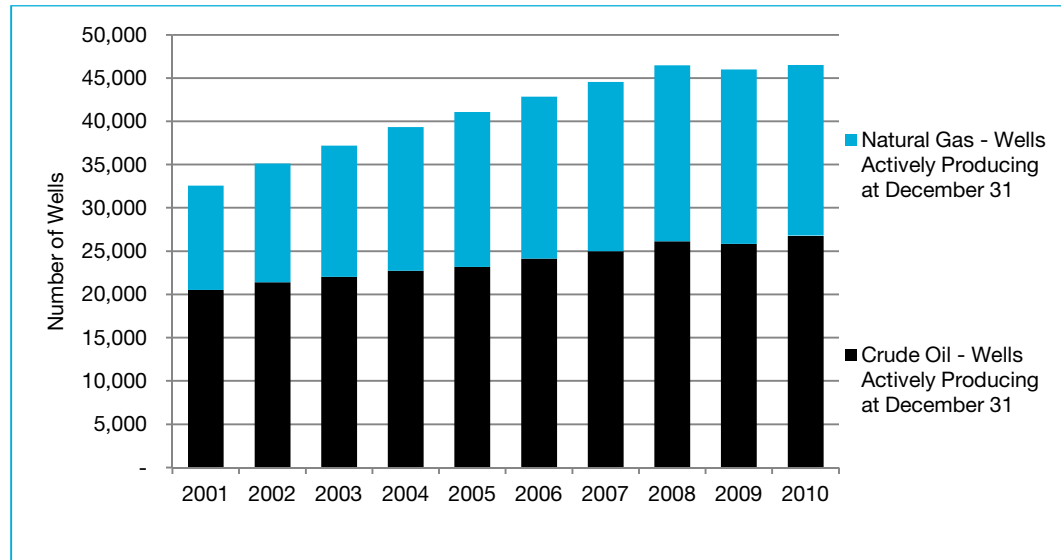
¹ Saskatchewan Energy and Resources 2010-11 Annual Report, p. 7.

² Prior to 2000, pipelines were "permitted" under previous legislation, *The Pipelines Act, 1998*. The current licensing procedure was adopted in 2000.

³ Under the previous act, *The Pipelines Act, 1998* pipelines not exceeding 15 km in length could be exempted from the permitting provisions.

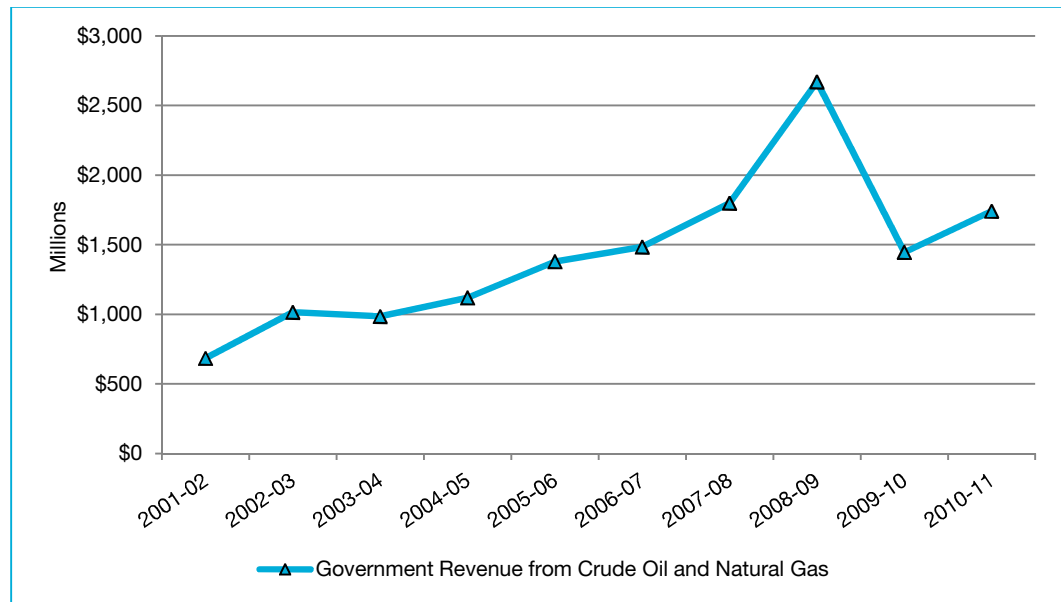
⁴ *The Pipelines Act, 1998* defines a flowline as a pipeline connecting a wellhead with an oil battery facility, a fluid injection facility or a gas compression processing facility and includes a pipe or system of pipes for the transportation of fluids within any of those facilities.

Figure 1—Ten-Year Comparison of Actively Producing Crude Oil and Natural Gas Wells in Saskatchewan



Source: 2008-09 Ministry of Energy and Resources Annual Report, pp. 24-25 and 2010-11 Ministry of Energy and Resources Annual Report, p. 29.

Figure 2—Government Revenue from Crude Oil and Natural Gas

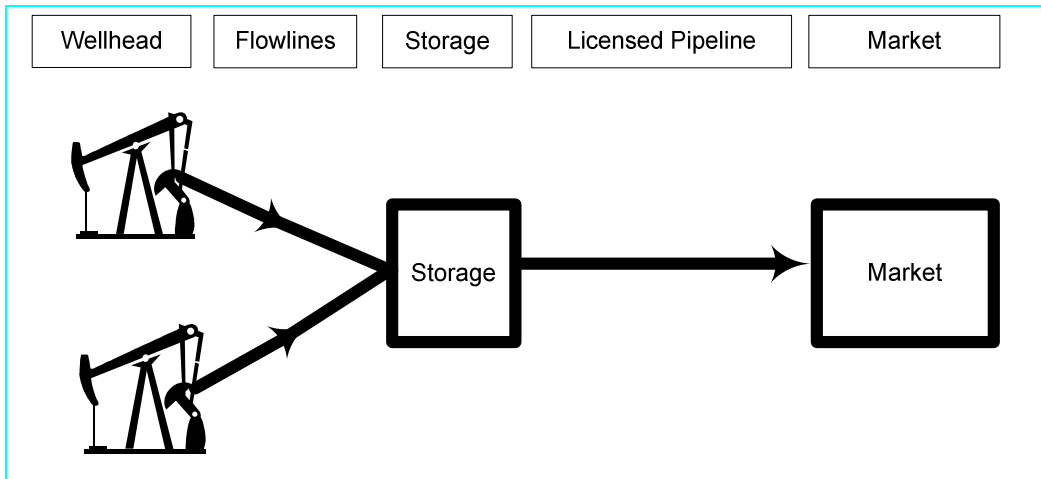


Source: 2010-11 Ministry of Energy and Resources Annual Report, p. 29.



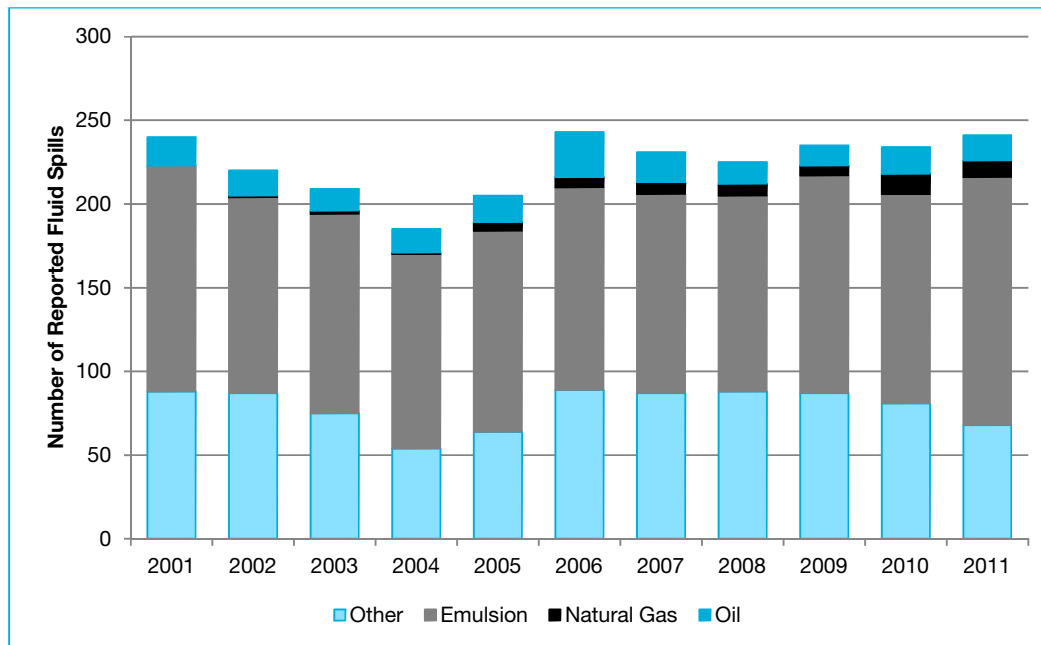
Figure 3 provides a diagram of the movement of oil and gas from wellhead through flowlines to pipelines to market.

Figure 3—Pipeline and Flowline Diagram



Pipelines transmit crude oil and natural gas throughout Saskatchewan on a daily basis. While pipelines are the safest and most efficient means of transporting crude oil and natural gas, pipeline failures can have serious consequences for people and the environment. A pipeline leak could contaminate both land and water. A pipeline explosion could result in fatalities or serious injuries. As Figures 4 and 5 show, Energy and Resources received reports on 246 pipeline spills (i.e., flowlines and licensed pipelines) in 2011.

Figure 4—Ten-Year Comparison of Pipeline Spills

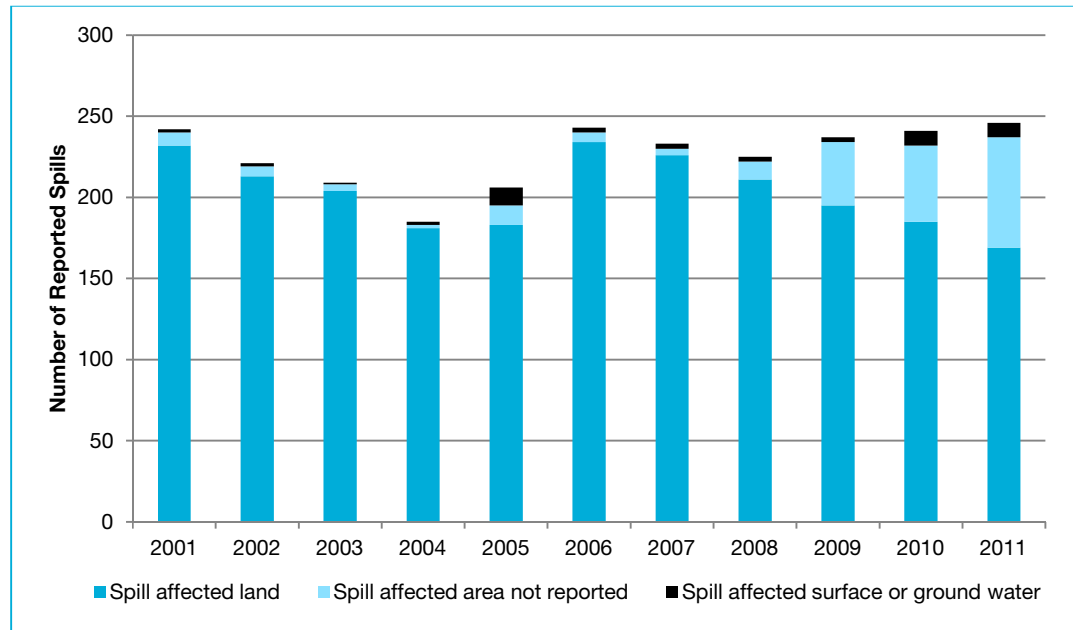


¹ Emulsion is a mixture primarily of oil and water as well as other substances.

² Other includes spills of: refined chemicals, salt water, fresh water, condensate and unknown substances.

Source: Saskspills.ca; March 23, 2012.

Figure 5—Ten-Year Comparison of Sites Affected by Pipeline Spills



Source: SaskSpills.ca; March 23, 2012.

3.0 BACKGROUND

The Pipelines Regulations, 2000, identify the minimum requirements for the design, construction, testing, operation, maintenance, and repair of pipelines. The minimum requirements set are the most recent version of Canadian Standards Association Standard Z662 (Standard) unless otherwise approved by the Minister. This Standard includes requirements for pipeline construction (design, construction, and pressure testing⁵) and ongoing operations (integrity, safety, and risk management processes). Exhibit 7.1 outlines the Standard's requirements.

Engineers design pipelines by considering factors such as the type of transported fluid and the desired operating pressure of the pipeline. The Standard provides detailed guidance on how to build and maintain a pipeline. For example, the Standard specifies the thickness of the pipe based on factors including the type of fluid it will carry and the planned operating pressure. Also, the design needs to consider issues such as the possibility of pipe corrosion.

The Standard sets out requirements for constructing the pipeline, e.g., how to install, join, and pressure test a pipeline prior to service. In addition, the Standard provides detailed guidance on how to weld the pipeline. The adequacy of welds is a critical step in the construction process. Weak or inadequate welds could lead to pipeline failures.

Beyond construction requirements, the Standard identifies specific matters for safety and risk management, operations, maintenance, and upgrades. The Standard requires pipeline operators to have processes in place to monitor the integrity of pipelines. This helps to ensure that operators detect minor issues and resolve them prior to a major

⁵ Energy and Resources uses pressure test results to determine whether it should approve a pipeline for use. This approval is known as a leave to open.



failure occurring. The Standard also requires pipeline operators to have processes to handle emergencies in the event of a disaster.

Regulators⁶, such as Energy and Resources, need to ensure that pipeline operators comply with the law including the Standard. Monitoring compliance includes reviewing pipeline applications, assessing the quality of construction, verifying pressure tests, approving pipelines for use, and reviewing pipeline operators' processes for maintaining the integrity and safety of their pipelines.

4.0 AUDIT OBJECTIVE, CRITERIA, AND CONCLUSION

The objective of this audit was to assess if Energy and Resources had effective processes to ensure compliance with *The Pipelines Act, 1998* and *The Pipelines Regulations, 2000*. Our audit covered the Ministry's systems for the year ended October 31, 2011.

To conduct this audit, we followed the *Standards for Assurance Engagements* published in the *CICA Handbook - Assurance*. Our approach to the audit included documenting our understanding of Energy and Resource's processes, reviewing guidance Energy and Resources provided to pipeline operators and staff, and testing key aspects of those processes during on-site visits.

To evaluate Energy and Resources' processes, we used criteria based on the work of other auditors and current literature listed in the selected references. Energy and Resources' management agreed with the criteria (See Figure 6).

Figure 6—Audit Criteria

<p>To have effective processes to ensure compliance with <i>The Pipelines Act, 1998</i> and <i>The Pipelines Regulations, 2000</i>, the Ministry should:</p> <ol style="list-style-type: none">1. Establish an appropriate management framework to monitor compliance<ol style="list-style-type: none">1.1 Establish clear roles and responsibilities1.2 Set policies and procedures1.3 Require information about pipeline construction, alterations, abandonment, and maintenance2. Evaluate compliance on a timely basis<ol style="list-style-type: none">2.1 Collect information required to monitor compliance with legislation2.2 Evaluate information2.3 Perform required actions2.4 Report findings3. Take action to improve compliance<ol style="list-style-type: none">3.1 Communicate required actions to stakeholders3.2 Monitor timely completion of required actions3.3 Report progress toward compliance to the Minister
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We concluded that, for the year ended October 31, 2011, the Ministry of Energy and Resources did not have effective processes to ensure full compliance with *The Pipelines Act, 1998* and *The Pipelines Regulations, 2000*.

There are requirements under *The Pipelines Act, 1998* and *The Pipeline Regulations, 2000* that are not being acted upon.

⁶ Manitoba, Alberta, and Saskatchewan all require pipeline operators to comply with the Standard.

Failure to regulate pipelines effectively could harm Saskatchewan people or the environment. For example, a major oil leak into the Souris River would have a significant impact on the province.

5.0 KEY FINDINGS AND RECOMMENDATIONS

In this section, we set out the criteria (expectations) in italics and key findings along with related recommendations.

5.1 Need to Establish an Appropriate Management Framework to Monitor Compliance

An appropriate management framework starts by establishing clear roles and responsibilities including defining who is responsible to manage pipelines. In its framework to monitor compliance of pipeline operators with The Pipelines Act, 1998 and The Pipelines Regulations, 2000, we expected Energy and Resources to:

- › *Establish clear roles and responsibilities*
- › *Set policies and procedures*
- › *Require information about pipeline construction, alteration, abandonment and maintenance*

Management has defined job descriptions for each staff member. The job descriptions set out each position's roles and responsibilities. A senior staff member is responsible for approving all pipeline licenses. Job descriptions clearly define staff responsibilities with respect to monitoring construction, pressure tests, and ongoing activities. Also, Energy and Resources has an approved delegated signing authority for applications and a documented system for those approvals.

Energy and Resources staff are experienced with pipelines and with the Canadian Standards Association Standard Z662 (Standard). For example, Energy and Resources employs a pipeline engineer and another staff member who is on the Canadian Standard Association's Z662 Technical Committee that sets the Standard. Also, management periodically meets with their provincial counterparts to discuss best practices and other regulatory matters.

Energy and Resources does not have documented policies and procedures for its staff to use to monitor compliance with the law including the Standard. For example, it does not have written policies and procedures for assessing construction or ongoing operations (quality, integrity, safety and risk management processes). Nor does it require its staff to use checklists or other forms of documentation to support their assessment of an application against the Standard. Without adequate written policies and procedures, staff lack guidance to carry out their work.



1. We recommend that the Ministry of Energy and Resources develop written policies and procedures to guide staff when assessing pipeline design, monitoring pipeline construction, and evaluating pipeline operations.

Energy and Resources' website provides pipeline operators with the Ministry's expectations. Pipeline operators are required to submit applications for design approval on all new pipelines, amendments to existing pipelines, the abandonment of old pipelines, and transfers of ownership. Energy and Resources defines its requirements for pipeline design in application guides and the pipeline license application form. For example, the application form requires pipeline operators to provide information on the proposed pipeline route including survey drawings and pipeline burial depth. The application forms also require information on the type of fluid to be carried, the proposed pipeline operating pressure, and the proposed construction materials.

The Standard is a large and comprehensive document. Management has not completed a formal risk assessment to determine the extent of the risk of pipeline failure or work necessary to mitigate the risk to an acceptable level at either the construction or operations phases. Management told us that it relies, in part, on the certification of the license application by a professional engineer representing the pipeline company that the pipeline has been designed in accordance with the Standard.

Energy and Resources has not established a framework to monitor compliance of pipeline operators' operations including maintenance, once a pipeline has been constructed and placed in operation. It does not request sufficient operational information from the pipeline operators once a pipeline has been in operation. For example, it does not request copies of integrity, safety, or risk management processes used by the pipeline operators. Without requesting and subsequently assessing this information, Energy and Resources will not know if pipeline operators properly maintain the pipelines or if a pipeline operator could adequately respond to an emergency event. We make a recommendation on this issue later in this report.

The Pipelines Regulations, 2000 require pipeline operators to report fires, escapes or release of fluids, or contact damage. The pipeline operator must also report the actions it took to fix the problem and clean up the site. The regulations do not require Energy and Resources to verify that the cleanup restored the site to an acceptable condition.

Energy and Resources regulates oil and natural gas from wellheads and related facility sites under *The Oil and Gas Conservation Act* and related regulations. This legislation requires Energy and Resources to ensure any spills from wellheads and related facility sites are appropriately remediated. However, the legislation does not apply to spills from pipelines that are reported in accordance with *The Pipelines Regulation, 2000*. Currently, if a pipeline operator chooses to report a pipeline spill to Energy and Resources, the process is that the staff will ensure the pipeline spill is appropriately remediated. Management told us that the vast majority of spills reported by pipeline operators are followed up by Ministry staff.

The Ministry of Environment is responsible for verifying the satisfactory cleanup for all manner of contaminants but it is specifically exempt from completing this work for

pipelines and flowlines under *The Environmental Spill Control Regulations*. As a result, no government agency is responsible to verify that pipeline operators cleanup a contaminated site to an acceptable condition.

2. **We recommend that the Ministry of Energy and Resources consider seeking responsibility in law to verify that pipeline operators clean up contaminated sites to an acceptable condition.**

5.2 Need to Evaluate Compliance on a Timely Basis

Evaluating compliance requires collecting the right information on a timely basis. To evaluate the compliance of pipeline operators with The Pipelines Act, 1998 and The Pipelines Regulations, 2000, we expected Energy and Resources to:

- › *Collect information required to monitor compliance*
- › *Evaluate the information*
- › *Perform required actions based on evaluation, e.g., collect missing information*
- › *Report findings to senior management*

As noted earlier in this chapter, Energy and Resources did not have written policies and procedures on how to assess pipelines from the initial pipeline license application through construction and ongoing operations including maintenance. As a result, it cannot ensure that pipeline operators are meeting the Standard.

We tested a sample of 15 license application forms for 34 new pipelines, 18 amended pipelines and 10 abandoned pipelines submitted during the year. We found that the application forms were complete and were certified by pipeline operators' professional engineers. For the pipelines applications we reviewed, we found that Energy and Resources' documentation was limited and inconsistent between files. For example, the Standard requires that the design pressure be calculated using the pipeline specifications. We found that pipeline operators included the design pressure in their applications. Except for one license application, we found no evidence that Energy and Resources verified the accuracy of the calculation or that the materials planned for in the pipeline design could withstand the calculated pressure.

Management asserted that it performed detailed reviews and verification work on each application. However, we found little documented evidence of their work in the pipeline files to support licensing decisions. Therefore, we cannot assess if Energy and Resources properly granted licenses.

3. **We recommend that the Ministry of Energy and Resources consistently document its assessments of pipeline license applications for compliance with the law prior to issuing pipeline licenses.**



Energy and Resources approves the pipeline license application for a pipeline plan or pipeline amendment. Mistakes or intentional changes during the construction process can occur. While it is important to have strong processes to review and approve pipeline licenses, doing so without proper follow up on construction cannot ensure a safe pipeline.

Energy and Resources understands the risks related to pipeline construction. For example, the job description for the pipeline engineer position states the incumbent shall “Witness construction activities and pressure tests to ensure compliance.” As per discussion with management, Energy and Resources does not have sufficient staff to carry out this work on-site or perform other procedures to evaluate pipeline construction.

None of the files we reviewed included evidence of on-site inspection. As a result, Energy and Resources does not have sufficient assurance as to whether pipelines are built as planned, whether pipeline quality is adequate or if any maintenance after construction is carried out in accordance with the Standard. This increases risks to public safety and the environment.

4. We recommend that the Ministry of Energy and Resources assess the resources it requires to fulfill its responsibilities under *The Pipelines Act, 1998*.

Pipeline operators are requested to obtain a leave to open once a pipeline is ready for service. To be granted a leave to open, Energy and Resources requires the pipeline operators to submit pressure test results showing that the pipeline can function safely at its intended operating pressure. For example, the pressure test results should include the equipment calibration, ground and ambient temperatures, and pipeline pressure readings.

Each pipeline file we reviewed contained pressure test supporting documents, a signed summary memorandum, and a formal letter noting Energy and Resources’ approval to put the pipeline into service. However for the pipeline files we tested, there was no evidence that staff verified the pressure test on-site.

Management told us that staff only witness pressure tests where a significant risk exists. We did not find any documentation where Energy and Resources assessed the riskiness of a pipeline application and the need to verify a pressure test on-site or guidance for staff to follow to carry out this assessment. During the period of our audit, we also found no evidence that Energy and Resources periodically assessed a sample of construction activities or pressure tests for compliance with the Standard.

5. We recommend that the Ministry of Energy and Resources implement a risk-based assessment approach to monitor pipeline construction and verify pressure tests.

Energy and Resources provides a memorandum reporting the results of its assessment of license applications on planned pipeline design to senior management. The Pipeline Engineer, the Manager of Pipelines, the Director, and the Assistant Deputy Minister approve the pipeline license applications in accordance with delegated authority. For all files we reviewed, Energy and Resources issued the pipeline license and later the leave to open on a timely basis.

While Energy and Resources has some processes to cover planning and construction of a pipeline, it has no documented processes to regulate existing pipelines and flowlines, as discussed later on in this chapter, once they are in operation. Energy and Resources did not request adequate information from pipeline operators related to their integrity management or safety processes. These processes are required under the Standard and are very important to ensure safe and reliable pipeline operations.

Energy and Resources does not have a documented process for reporting potential findings to senior management on pipeline operator compliance to the Standard once a pipeline is in operation.

6. We recommend that the Ministry of Energy and Resources monitor pipeline operator compliance with integrity management and safety processes for existing pipelines.

5.3 Need to Take Action to Improve Compliance

Energy and Resources needs to communicate required actions to pipeline operators on a timely basis. To take action to improve pipeline operators' compliance with The Pipelines Act, 1998 and The Pipelines Regulations, 2000, we expected Energy and Resources to:

- › *Communicate required actions to pipeline operators*
- › *Monitor timely completion of required actions*
- › *Report progress toward compliance*

We found that two new pipelines in our sample of ten were built without Energy and Resources' prior approval. In these cases, it was the pipeline operator who informed Energy and Resources that they built a pipeline prior to applying for a license. When Energy and Resources became aware of these cases, it took corrective action with the pipeline operator on a timely basis. In both cases, the pipeline operator stopped pipeline operations while Energy and Resources reviewed the formal pipeline license application. Ongoing operations did not restart until Energy and Resources approved the pipeline application and leave to open.

We saw communications on compliance with pipeline operators on the license and leave to open approvals. Management also told us it engages in regular communication with pipeline operators. However, due to the weaknesses we found in documenting evaluations and monitoring compliance as described earlier in this chapter, it is not



possible to know whether all instances of non-compliance that should have been reported to pipeline operators were reported.

6.0 FLOWLINES CURRENTLY NOT LICENSED

During the course of our audit, a related issue came to our attention. As noted above, Energy and Resources manages a large number of pipelines and flowlines. *The Pipelines Act, 1998* requires Energy and Resources to license pipelines. However, flowlines do not currently require licensing under the Act. The lack of a requirement to license flowlines could pose future safety and environmental problems for the province.

Flowlines are generally smaller and shorter pipelines that connect a wellhead to a storage or other facility. Flowlines pose the same type of environmental risks as larger pipelines but are located by the wellhead.

Presently, Energy and Resources does not have records of where the flowlines are located in the province or if pipeline operators have designed, constructed and are operating them according to the law. The number of flowlines continues to increase significantly, with between 3,000 and 4,000 new flowlines being constructed each year in the province.

Saskatchewan is not unique in terms of the number of flowlines. Alberta also has a significant number of flowlines. However, we note that the Government of Alberta has required flowline licensing for many years.

Pipeline operators are required to follow the Standard for both flowlines and pipelines under *The Pipelines Regulations, 2000*. Therefore, the recommendations we made earlier in this chapter also apply to flowlines.

7. We recommend that the Ministry of Energy and Resources consider seeking responsibility in law to license flowlines.

Management told us it is seeking amendments to *The Pipelines Act, 1998* to license flowlines. Energy and Resources recognizes that this represents a significant undertaking given the large number of existing flowlines and the anticipated number of new flowlines that are constructed each year. Management also recognizes that this undertaking will require additional financial and human resources.

7.0 EXHIBIT

7.1 Canadian Standards Association Z662-11–Oil and Gas Pipeline Systems

The Pipelines Act, 1998 states that the minimum requirements for the design, construction, testing, operation, maintenance, and repair of pipelines shall be in

accordance with the most recent version of CSA Standard Z662 unless otherwise specified by the Minister. The Minister responsible for Energy and Resources has not specified another Standard.

The following includes a brief description of the key applicable clauses in the Standard.⁷

Safety and loss management systems, integrity management programs, and engineering assessments for oil and gas industry pipeline systems – Clause 3 states operating companies shall develop, implement, and maintain a documented safety and loss management system for pipeline systems that provides for the protection of people, the environment, and property.

Design – Clause 4 includes the requirements for the design of pipeline systems constructed primarily from steel, including compressor stations over 750 kW and pump stations over 375 kW.

Materials – Clause 5 provides guidance on pipe threshold stress values, notch toughness, and defines limitations for pipe and components. Materials and equipment that will become part of the pipeline system must be suitable for the conditions to which they are to be subjected.

Installation – Clause 6 covers the installation of piping, the requirements for new and replacement installations, and the use of new and used materials.

Joining – Clause 7 covers the requirements for joining pipes, components, and non-pressure-retaining attachments to piping by means of arc welding, gas welding, explosion welding, and mechanical methods.

Pressure testing – Clause 8 sets the minimum requirements for pressure testing pipelines. The clause provides specific guidance for strength and leak tests, the duration of testing, and defines acceptable testing procedures and techniques.

Corrosion control – Clause 9 covers the requirements for the control of corrosion of steel pipeline systems that are buried, submerged, or exposed to the atmosphere.

Operating, maintenance, and upgrading – Clause 10 includes information on safety, training, security, leak detection, and emergency processes. The clause also sets requirements for repairing damaged pipelines.

Sour service pipelines – Clause 16 specifies provisions for the design, materials, construction, operation, and maintenance of sour service pipelines. These are pipelines designed to transmit gas that exceeds 0.30 kPa hydrogen sulfide at the design pressure. Hydrogen sulfide is a very poisonous and flammable gas.

Annexes – Informative documentation intended to aid operators in meeting specific requirements of the Standard. For example, Annex A sets out a recommended practice for a safety and loss management system that conforms to the mandatory requirements within the Standard.

⁷ The standard also provides guidance for offshore steel pipelines, gas distribution systems, oilfield steam distribution pipelines, and for specific pipeline materials such as aluminum, composite, and polyethylene.



8.0 SELECTED REFERENCES

- Australia. National Audit Office. (March 2007). *Administering regulation: Better practice guide*. Canberra, Australia: Author.
- Canadian Standards Association. (September 2007). *Student Guide to CSA Z662, Oil and Gas Pipeline Systems*. Mississauga, Canada: Author.
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